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STUDIES IN THE LAURACEAE, III. SOME CRITICAL AND NEW SPECIES OF ASIATIC LINDERA, WITH OCCASIONAL NOTES ON LITSEA

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THE SPECIES treated herein represent only those difficult of recognition in the herbarium. No attempt has been made to make a complete citation of literature, for this was done in 1932 by Liou.[1] Only supplementary and later publications have been noted where necessary. The *Litsea* species included are only incidental in clearing up certain species which have been confused with *Lindera*.

Lindera assamica (Meissn.) Kurz, For. Fl. Brit. Burma **2:** 308. 1877; Hooker f., Fl. Brit. Ind. **5:** 182. 1886; Liou, Laurac. Chine Indoch. 125. 1932.

Aperula assamica Meissn. in DC. Prodr. 15[1]: 240. 1864, p.p.

DISTRIBUTION: India.

Lindera assamica, as well as *L. Meissneri,* has been reported from China. Liou even described a variety of the latter, var. *kwangtungensis* from the province of Kwangtung. Closely related is *Lindera annamensis* Liou from French Indo-China. *Lindera assamica,* as interpreted by King, according to Hooker f., l.c., is based on *Jenkins 1171,* from Bhotan, and has large elliptic or lanceolate-elliptic membranaceous leaves up to 15 cm. long, with prominent reticulation on the upper surface. The inflorescences are numerous on slender peduncles, the branchlets as well as the leaves beneath are rusty- or tawny-hirsute and pubescent (fide Hooker f., l.c.). *Jenkins 124* (Hooker states that this number is erroneously credited to Jenkins), the second specimen on which Meissner based *Aperula assamica,* is not the latter but *L. Meissneri* King

[1] Liou, Ho, Lauracées de Chine et d'Indochine. Paris, 1932.

in Hook. f. The material from China does not belong in this species. It has leaves which are far more coriaceous, and inflorescences which are borne on stouter peduncles. There is not the fragile, delicate appearance in the Chinese specimens that one notes at once in the Indian.

Lindera Meissneri King in Hooker f., Fl. Brit. Ind. **5**: 182. 1886; Liou, Laurac. Chine Indoch. 126. 1932.

Aperula assamica Meissner in DC. Prodr. **15**[1]: 240. 1864, p.p.

DISTRIBUTION: India.

The leaves of the above are never more than 9 cm. long, and are caudate-acuminate, dark, glabrous, shining above, and borne on more slender petioles than those of *Lindera assamica*. The inflorescences are smaller and the branchlets are smooth. Again, the Chinese material is no match for the species, for the same reason that it must be kept apart from *L. assamica*, i.e., the specimens are heavier and coarser.

Lindera Meissneri King f. **lenticellata** Liou, Laurac. Chine Indoch. 126. 1932.

DISTRIBUTION: French Indo-China.

Liou described this variety from Tonkin as differing from the type in having its branchlets covered with lenticels, and its leaf-blades smaller and finely long-acuminate. With the types of both the species and variety at hand, the differences appear to be the numerous lenticels present on the branchlets of the variety, the more coriaceous leaves, the upper surface of which is opaque as opposed to the shining upper surface of the leaves of the species. The size of the leaves as well as their caudate-acuminate tips scarcely varies between the species and the variety. Many specimens from Yunnan have the lenticels but the leaves are shining above and not as dark as those of Liou's variety. These former will be taken up later. The type of the following species (Liou's var. *kwangtungensis*) has lenticels on the branchlets, though not as plentifully as in the variety *lenticellata*.

Lindera kwangtungensis (Liou), comb. nov.

Lindera Meissneri King f. *kwangtungensis* Liou, Laurac. Chine Indoch. 126. 1932.

Arbor 6–20 m. alta, ramulis teretibus, junioribus angulatis striatis lenticellatis minute pubescentibus. Folia alterna, lanceolata vel lanceolato-elliptica, subcoriacea, 5–10 cm. longa et 1.5–3 cm. lata, obtusa, acuta vel acuminata, ad basim acuta, utrinque glabra, conspicue reticulata, supra opaca, subtus glaucissima, penninervia, nervis 4–8-jugis, utrinque plerumque inconspicuis, costa subtus conspicue elevata, fusca,

petiolo 7–10 mm. longo, glabro. Inflorescentiae ♂ umbellae numerosae ad apicem ramulorum aggregatae, sessiles brevi-pedunculataeve, axillares vel in ramulis brevibus subterminales, pedunculatae, pedunculis, 12–20 mm. longis gracilibus adpresse pubescentibus. Flores 4–9, ± 3 mm. longi, pedicellis tenuibus 5–6 mm. longis adpresse pubescentibus, lobis 6 sparse pubescentibus ellipticis, staminibus 9, 3 interioribus bi-glandulosis. Fructus subglobosus, 5–6 mm. diam., apiculatus, glaber, viridi-nigrescens, disco 2–3 mm. lato, pedicello 4–6 mm. longo crasso rugoso.

DISTRIBUTION: southeastern China (Kwangtung, Hainan, Kwangsi).

KWANGTUNG: *S. P. Ko 50170* (TYPE of *L. Meissneri kwangtungensis*, ♂, NY). HAINAN: *F. C. How 73449; H. Y. Liang 63521, 64753; N. K. Chung & C. L. Tso 44341.* KWANGSI: *C. Wang 40694; W. T. Tsang 24307* (possibly).

This variety seems worthy of specific rank, since the differences are more than the smaller leaves and the nerves less salient below, which Liou gives as the distinguishing characters. The leaves are more coriaceous than those of the species, their reticulation more conspicuous, the under surface more glaucous, the upper surface opaque instead of shining, and the inflorescence longer and less slender than in the species. There seem to be no short shoots bearing inflorescences as is typical in the variety and the branchlets of the latter are somewhat lenticellate.

Lindera kwangtungensis (Liou) Allen f. **robusta**, f. nov.

A typo differt foliis majoribus, late ellipticis, abruptius acuminatis, ad basim attenuatis, petiolis ad 2 cm. longis, crassis.

DISTRIBUTION: southeastern China (Hainan).

HAINAN: Chim Fung Mt., near Sha Mo Kwat Village Kan-en District, *S. K. Lau 5083* (TYPE ♂, AA), fairly common, height 14 m., diam. 27 cm., flower yellow; *N. K. Chun & C. L. Tso 44340*, pp. (fruit, AA), *43871, 44101, 44170, 44329; H. Y. Liang 63379, 64528; L. Tang 444; C. Wang 35922.*

The form differs from the species in having leaves up to 12 cm. long and broadly elliptic, more abruptly acuminate, and more attenuate at the base, with stouter petioles up to 2 cm. long. The flowers of the ♀ inflorescence are very densely pubescent. The original sheet labeled *Chun & Tso 44340* consisted of two entities — *Lindera kwangtungensis* and a species of *Linociera.*

Lindera Metcalfiana, spec. nov.

Arbor vel frutex 3–12 m. altus, ramulis teretibus, junioribus plus

minusve angulatis striatis rubro-brunnescentibus glabris. Folia alterna, elliptica, membranacea, 9–14 cm. longa et 3–4 cm. lata, acuminatissima caudatave, saepe falcata, ad basim acuta, glabra, utrinque reticulata, opaca, supra viridiscentia, subtus plus minusve glauca, penninervia, nervis 8–10-jugis, supra impressis, subtus elevatis, rubescentibus, petiolo 10–12 mm. longo, glabro. Umbellae ♂ paucae vel solitariae, axillares, pedunculatae, bracteis glabris deciduis, pedunculis 7–15 mm. longis tenuibus glabrescentibus. Flores 5–10, pubescentes, virides (fide collectoris), pedicellis 3–5 mm. longis minute pubescentibus, lobis 6 oblongo-ovatis sparse pubescentibus, staminibus 9, 3 interioribus bi-glandulosis. Fructus globosus ± 6 mm. diam., nigrescens, disco parvo pubescente 3–4 mm. lato leviter dentato ciliato, pedicello ± 6 mm. longo, crasso. Umbellae ♀ ignotae.

DISTRIBUTION: southeastern China. (Hainan, Kwangtung, Kwangsi).

HAINAN: *C. Wang 36163* (TYPE, AA), January 6, 1934, tree 12 m. high, diam. ½ m., in mixed woods, fl. green, *35720, 36156; H. Y. Liang 63464; S. K. Lau 5216; N. K. Chun & C. L. Tso 44044.* KWANGTUNG: *Wang & Ling* for *W. Y. Chun 7405, 7376; Y. Tsiang 798; C. C. C.* (under direction of Levine) *3087.* KWANGSI: *R. C. Ching 8198; S. K. Lau 28746.*

The species belongs in the group with the preceding species, but is distinct from them. It has the membranaceous leaves (which appear rather thicker in the fruiting specimen, as is to be expected), with reticulations similar to but not as distinct as those of *L. Meissneri.* Nor are the leaves shining above, nor quite as glaucous below, and they are more caudate than those of the latter. *Wang & Ling 7376* and *C. C. C. 3087,* from Kwangtung, have leaves approaching a coriaceous texture and more prominently reticulate than the specimens cited above. In this respect, they suggest the succeeding species from western China, though for the present they will be left as *L. Metcalfiana,* presumably their nearest relative.

The following numbers collected by H. T. Tsai in Yunnan are probably specimens of very young flowers. The buds are advanced enough to show the anthers with the unmistakable two locules. The affinity is with *L. Metcalfiana* from Kwangtung and Hainan, though there are a few differences noted. The branchlets and veins are less reddish in the Yunnan material. The leaves are shorter, usually, and broader, and in some instances the glaucescence of the underleaf surface is not as apparent as in the Hainan specimens. The individuals from Yunnan are in too young a state to enable satisfactory dissection which might produce further differentiating characters, so for the time being they

will be included with *L. Metcalfiana*. YUNNAN: *H. T. Tsai 51556, 51634, 51674, 51683.*

The above is named for Dr. Franklin P. Metcalf, Curator of the Herbarium of Lingnan University and a keen student of the flora of southeastern China.

Lindera dictyophylla, spec. nov.

Arbor 2.5–9 mm. alta, ramulis teretibus, junioribus plerumque angulatis striatis, rubro-brunnescentibus glabrescentibus. Folia alterna, lanceolata, 8–13 cm. longa et 2.5–3.5–(4) cm. lata, coriacea, attenuate acuta vel acuminata, basi acuta, glabra, utrinque crasse reticulata, supra plus minusve nitida, viridiscentia, subtus glauca, penninervia, nervis 5–8-jugis supra impressis subtus elevatis brunnescentibus, petiolo 6–12 mm. longo pubescente vel glabrescente. Inflorescentiae ♂ sessiles vel brevipedunculatae. Umbellae usque 5, axillares, pedunculatae, bracteis deciduis, pedunculis 5–7 mm. longis paullo crassis pubescentibus. Flores 10–12, pubescentes, flavo-albi (fide collectoris), brevi-pedicellati, lobis 6 oblongis utrinque pubescentibus, staminibus 9 leviter exsertis, 3 interioribus bi-glandulosis. Umbellae ♀ 2–4, axillares, pedunculatae, bracteis deciduis, pedunculis 5–6 mm. longis paullo crassis, pubescentibus. Flores 10–12, pubescentes, viridi-albi (fide collectoris), brevi-pedicellati, lobis 6 ovatis, staminodiis 9, 3 interioribus bi-glandulosis. Fructus globosus, ± 6 mm. diam., viridescenti-purpurascens (fide collectoris), disco parvo pubescente 3–4 mm. lato leviter dentato-ciliato, pedicello ± 5 mm. longo crasso pubescente.

DISTRIBUTION: western China (Yunnan).

YUNNAN: Shun-Ning Hsien, *C. W. Wang 71835* (TYPE ♂, AA), mountain slope, February 1936, alt. 2800 m., flower yellowish-white; *C. W. Wang 71992,* same locality and date, alt. 2700 m., flower greenish-white (♀, AA); Fo-Hai, *C. W. Wang 77395,* alt. 2000 m., fruit green to purple, aromatic (AA); *C. W. Wang 74186, 76276, 78273; H. T. Tsai 51924; G. Forrest 9562, 9674, 26204, 26212.*

Forrest 26212 has more uniformly larger leaves than most of the Wang numbers. In number 9674 the leaves are more elliptic than lanceolate. In number 26204 the tendency is toward a more leafy branch with the leaves smaller and distinctly elliptic. Number 9562 is also more leafy with smaller leaves, ovate rather than lanceolate. These data are noted here to indicate the extreme variability of the species.

The following specimens are very leafy. The mature leaves are shining, dark brown above and paler below, varying in size and shape on the same branch, lanceolate to elliptic. The very young leaves and

branchlets are clothed in golden brown, closely appressed pubescence which is early deciduous. The color of the leaves in the entire Tsai collection means nothing, for it is apparent that the specimens were dried artificially and burned in the process, in some cases very severely. YUNNAN: *H. T. Tsai 56351, 56760, 56794, 56801, 56809, 56869, 56876, 56877.*

In this complex from Yunnan, there appear to be about three entities, where the leaves are coriaceous, mostly shining above and extremely reticulate, usually glaucous below. There is a great temptation to describe three separate species, because of the fact that the groups of specimens seem to be so very different. Close study reveals the impossibility of separating any of them on good characters that do not vary. Such characters as leaves shining above, and glaucous below, for example, altitude, season of collection, and conditions of drying the specimens undoubtedly play an important part in modifying these characters. Since in this group glaucescence is determined apparently by the state of the minute exudations from each cell of the lower leaf epidermis, it is easy to understand that the natural appearance of the leaf might be changed easily by any one of the factors mentioned above.

The following numbers mostly from Yunnan, show smaller leaves, more variable in size than those cited under the species. There seems to be a trend toward more numerous inflorescences per branch, the upper surface more or less shining, the under glaucous. YUNNAN: *A. Henry 12822, 12822 A,B,C, 13285; G. Forrest 9525; H. T. Tsai 51557; C. W. Wang 78378.* KWANGSI: *A. N. Steward & H. C. Cheo 133.*

Lindera longipedunculata, spec. nov.

Frutex 3–6 m. altus, ramulis teretibus, junioribus angulatis striatis rubescentibus vel brunnescentibus glabris. Folia alterna, elliptica, subcoriacea, 8–15 cm. longa, et 3–5 cm. lata, acuta vel abrupte acuminata, glabra, utrinque crasse reticulata, supra opaca, viridi-brunnescentia, subtus glauca, penninervia, nervis 8–10-jugis supra leviter subtus conspicue elevatis brunnescentibus, costa supra plerumque impressa, petiolo 10–12–(15) mm. longo glabro. Inflorescentiae ♂ sessiles vel brevipedunculatae. Umbellae plerumque solitariae, pedunculatae, bracteis deciduis glabris, pedunculis 2–2.5 cm. longis tenuibus gracillimis saepe curvatis glabris. Flores 6–8–(12?) pallide flavescenti-virides (fide collectoris), pubescentes, lobis 6 oblongis utrinque pubescentibus, staminibus 9–10, 5–6 bi-glandulosis. Fructus globosus, ± 5–6 mm. diam., nigrescens, immaturus viridis (fide collectoris), disco parvo glabrescente, 3–4 mm. lato leviter dentato ciliato, pedicello ± 1 cm. longo leviter crasso.

DISTRIBUTION: western China (Yunnan).

YUNNAN: Taron-Taru Divide, Tehgai, *T. T. Yü 20986* (TYPE ♂, AA), November 5, 1938, evergreen shrub 10 ft., common among mixed forest, alt. 2300 m. ♂, fl. pale yellowish green; Lungnan, same locality, *T. T. Yü 20014,* August 28, 1938 (fruit & ♀ fl., AA); *T. T. Yü 20876, 20986; G. Forrest 16065, 16104, 17528.*

This species is set apart from the preceding species of the group by its loosely reticulate, opaque, elliptic, abruptly acuminate leaves, always glaucous below; and by its striking inflorescence with long, slender, graceful peduncles, often curving beneath the weight of the large, full-flowered umbels at their tips.

Lindera latifolia Hooker f., Fl. Brit. Ind. **5:** 183. 1886; Liou, Laurac. Chin. Indoch. 125. 1932.

DISTRIBUTION: India and western China (Yunnan).

INDIA. E. Bengal: Griffith (Kew Distrib. No. 4321) (TYPE, Kew; isotype, Gray).

CHINA. Yunnan: *C. W. Wang 67011, 72101, 72527; A. Henry 13269; G. Forrest 9613, 9633, 15846, 17541, 17688; T. T. Yü 17252; H. T. Tsai 54331, 54407, 56368, 56392, 56866, 56892, 58903.*

Of the species of this particular group there is only one of which material is plentiful and that is the above species, described from India. Outside of India, thus far, it is to be found in the province of Yunnan only. There is variation to be seen in the Yunnan plants but there is no doubt that they represent the Chinese form of Hooker's species. The latter is distinct, because of the broad leaves which are greyish glaucous below, with the veins covered with an almost ferrugineous pubescence. *Lindera Balansae* from Tonkin, has this same distinctive lower-leaf surface, but can be separated readily by the much more narrow lanceolate to oblong-lanceolate leaves, as opposed to the broadly obovate or elliptic leaves of *L. latifolia. Lindera racemosa,* also from Tonkin, and very close to *L. Balansae,* according to the description and the photo of the type available, is distinguished by lack of pubescence on the lower leaf surface and by the presence of numerous umbels from a common peduncle, instead of the solitary, or at most, 2 umbels found in *L. Balansae.*

The Tsai specimens from Yunnan lack, for the most part, the characteristic grey-glaucous lower leaf surface, though the usually attending pubescence is even more dense than in the type. Except for this feature, the specimens do not vary enough to warrant a new variety. As has been mentioned before, the Tsai material seems to have been badly

burned, so any variation in leaf texture may be expected of the specimens.

Lindera glauca (S. & Z.) Blume, Mus. Bot. Lugd.-Bat. **1**: 325. 1851; Liou, Laurac. Chine Indoch. 129. 1932.

Benzoin glaucum S. & Z. in Abh. Akad. Muench. 4^3: 205. (Fl. Jap. Fam. Nat.) 1846; Nakai, Fl. Sylv. Kor. **22**: 80, t. 14. 1939.

For complete synonymy, see Liou, l.c.

DISTRIBUTION: Japan and China.

Nakai l.c. has made a var. *glabellum* of the above species as follows: "Folia adulta infra secus costas et margine infra medium pilosella, cetera glaberrima." No specimens of the variety are available, but variation or density of pubescence do not seem strong enough characteristics on which to set up a variety. Examination of type material may show sufficient differences, not mentioned in the description.

Lindera angustifolia Cheng in Contr. Biol. Lab. Sci. Soc. China **8**: 294 fig. 21. 1933.

Benzoin sinoglaucum Nakai, Fl. Sylv. Kor. **22**: 79. 1939.

DISTRIBUTION: eastern China (Chekiang, Kiangsi, Kiangsu, Hupeh and Kwangtung).

CHEKIANG: *S. Chen 1028* (TYPE ♀ fl. of *B. sinoglaucum*, Tokyo; isotype, AA); *2554; R. C. Ching 4814; F. N. Meyer 230.* KIANGSI: *F. B. Forbes 1417* (probably other Chinese specimen without number cited by Nakai, l.c. under *B. sinoglaucum*); *A. N. Steward 2734; Y. L. Keng 1519; E. H. Wilson 1634.* KIANGSU: *Y. L. Keng 2387; C. L. Tso 1737* (cited with original description of *L. angustifolia*), *819, 889, 1209, 1432, 1678; R. C. Ching & C. L. Tso 466, 502, 552, 674, 696, 702, 709, 724; J. Hers 2313.* HUPEH: *H. H. Chung 9067; S. C. Sun 24.* KWANGTUNG: *F. A. McClure 353* (*102, 2721*); *C. L. Tso 20262.*

A species which is similar to *Lindera glauca* in texture and leaf surface yet differs in the leaf shape which is lanceolate or oblong-lanceolate, as opposed to the obovate-elliptic leaves of *L. glauca*. *Chen 1028* (type of ♀ flowers) and *Forbes 1417*, cited by Nakai with the description of his new segregate from *Lindera angustifolia* do not appear to vary sufficiently from the latter to warrant specific or even varietal delimitation.

Lindera communis Hemsl. in Jour. Linn. Soc. Bot. **26**: 387. 1891; Liou, Laurac. Chine Indoch. 130. 1932.

Benzoin commune (Hemsl.) Rehder in Jour. Arnold Arb. **1**: 144. 1919.
Lindera yunnanensis Léveillé in Fedde, Rep. Spec. Nov. **10**: 371. 1912.
Lindera Bodinieri Léveillé, l.c.

Lindera Paxiana H. Winkler in Limpricht, Bot. Reis. Hochgeb. Chin. 382. 1922.

Lindera glauca Blume var. *nitidula* Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 115. 1913.

Beilschmiedia parvifolia Lecomte, l.c. 110.

DISTRIBUTION: China and French Indo-China.

Lindera communis has leaves lanceolate-acuminate, 5–9 cm. long, which vary considerably in leaf surface. The upper surface may be shining and smooth, or dull and minutely reticulate, while the lower may be glabrescent to densely pubescent. The pubescence of the branchlets is variable also. The species is wide-spread throughout China.

In the same group with *Lindera communis* Hemsl., described from central China are found *Lindera nacusua* (D. Don) Merr. (erstwhile *L. bifaria* Benth.) and *L. Laureola* Coll. & Hemsl., from India.

Lindera communis Hemsl. var. **grandifolia** Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 118. 1913; Liou, Laurac. Chine Indoch. 131. 1932.

DISTRIBUTION: French Indo-China.

Lecomte's variety, of which only a photo is available, seems to be fairly true to the type of the species except for the larger leaves.

Lindera Laureola Collet & Hemsley in Jour. Linn. Soc. Bot. **28**: 119. 1890; Liou, Laurac. Chine Indoch. 130. 1932.

Benzoin Laureolum (Coll. & Hemsl.) Chun in Contr. Biol. Lab. Sci. Soc. China. **1**[5]: 45. 1925.

DISTRIBUTION: Burma.

In leaf shape, size and habit, generally, the above recalls *L. communis*. The leaves are more elliptic-lanceolate than lanceolate and there is a complete lack of pubescence except on the inflorescence. The bracts are glabrescent, the corolla sparingly pubescent and the pedicels densely so.

Lindera Nacusua (D. Don) Merrill in Lingnan Sci. Jour. **15**: 419. 1936.

Laurus Nacusua D. Don, Prodr. Fl. Nepal. 64. 1825.

Tetranthera bifaria Wallich, List. No. 2530. 1830, nomen nudum.

For complete synonymy, see Merrill, l.c.

DISTRIBUTION: southeastern Asia.

INDIA: Nepal, *Wallich No. 2530*, pp. (ISOTYPE of *Tetranthera bifaria* Kew, NY).

FRENCH INDO-CHINA. Annam: *E. Poilane 24655.*

CHINA. Yunnan: *C. W. Wang 80470; T. T. Yü 19457.* Szechuan: *Y. Liu 1639, 1784.*

Lindera Nacusua as based on *Laurus Nacusua* D. Don was described according to Don from a specimen of Hamilton from Nepal. Nees described *Daphnidium bifarium* based on *Tetranthera bifaria* Wallich No. 2530, also from Nepal, from Wallich's collection of 1821, and Blinkworth's specimen from Kamaon. The leaves of the specimens at hand from the Wallich Herbarium vary from 5–15 cm. in length, are lanceolate to broadly lanceolate, acuminate, with short appressed pubescence on the lower surface. All have in common somewhat elevated reticulation on the undersurface of the leaves. The young branchlets are densely tomentose. Hooker f. (Fl. Brit. Ind. **5**: 184. 1886) included *Laurus Nacusua* as a synonym of *L. bifaria.* The Griffith specimens which he cites have broadly lanceolate to elliptic leaves somewhat acuminate to acute, with extremely prominent reticulation below, the veins densely villous as opposed to the not too prominent reticulation and dense, short-appressed pubescence of the leaves of *L. Nacusua.* Possibly the following numbers belong with this species. KWANGTUNG: *W. T. Tsang 28511.* HAINAN: *S. K. Lau 5263; F. C. How 72808, 73304.*

Lindera Doniana, spec. nov.

Arbor parva (?), ramulis crassiusculis rugulosis griseo-brunnescentibus glabris, junioribus ferrugineo-tomentosis. Folia alterna, late lanceolata vel elliptica, subcoriacea, 5–7 cm. longa et 2–2.5–(3) cm. lata, acuminata, acuta vel saepe subrotundata, vel leviter emarginata, basi cuneata, supra initio glabrescentia demum glabra, saepe nitida, subtus pallida, crebre ac conspicue reticulata, penninervia, nervis 7–10-jugis supra valde impressis subtus bene elevatis dense villosis, petiolo 5–8 mm. longo crasso pubescente. Umbellae ♂ sessiles, 1–3, brevi-pedunculata, bracteis plus minusve persistentibus, extus ad medium adpresse pubescentibus. Flores 6–8, lobis 6 (?), (post anthesin tantum visa). Fructus subglobosus ± 6 mm. diam., nigrescens, cupula pubescente planiuscula ± 3 mm. lata, pedicello 3.5 mm. longo pubescente crasso.

DISTRIBUTION: India and China (Yunnan).

INDIA. Bengal: *Griffith* (Kew Distrib. No. *4314*) (TYPE, Kew; isotype AA); Khasia: *J. D. Hooker & T. Thomson,* regio trop. 3–4000 ped. (as *Daphnidium bifarium* Nees var.?) (G).

CHINA: Yunnan: *T. T. Yü 20015.*

These specimens, because of their distinctive venation, recall the Japanese species, *Litsea acutivena* Hayata. The *Litsea* species, however,

have definitely cano-sericeous bracts which are even more persistent than those of *Lindera Doniana*. And while in the latter species there is a tendency toward rounded leaf tips, in the former it is the usual case.

Litsea Merrilliana, spec. nov.

Arbor parva vel frutex ad 2 m. altus, ramulis teretibus striatis, junioribus rubescentibus maturis griseis glabris. Folia alterna, oblongo-lanceolata, saepe lanceolata vel elliptica, subcoriacea, 2–7 cm. longa et 1.5–3 cm. lata, acuta vel acuminata, basi obtusa subrotundatave, utrinque glabra, supra minute alveolata, viridia, subtus pallida vel glauca, pennivervia, nervis 8–12-jugis flavis, costa utrinque elevata, petiolo 5–10 mm. longo glabrescente. Umbellae ♂ solitariae, axillares, pedunculatae, numerosae, pedunculis gracilibus ad 5 mm. longis pubescentibus, bracteis pallidis adpresse ferrugineo-pubescentibus. Flores pauci, immaturi, pallide virides (fide collectoris) lobis 6 (?), staminibus 7 (?), filamentis pubescentibus. Umbellae ♀ paucae, axillares, pedunculatae, pedunculis 5–6 mm. longis gracillimis glabrescentibus, bracteis adpresse-pubescentibus deciduis. Flores ± 5, virides (fide collectoris), brevi-pedicellati. Fructus oblongus ± 6 mm. longus viridis (fide collectoris), disco 2.5 mm. lato, pedicello ± 2 mm. longo crasso planiusculo subconcavo.

DISTRIBUTION: southern China. (Kwangsi, Kweichow).

KWANGSI: Tzu Yuen District, *T. S. Tsoong* (*Z. S. Chung*) *83503* (TYPE ♂, AA), August 4, 1937, small tree in woods, leaves deep green above, pale green beneath, flower pale green; *T. S. Tsoong 83456; C. Wang 39562* (very young ♀ flower and old fruit). KWEICHOW: Fan Ching Shan *A. N. Steward, C. Y. Chiao & H. C. Cheo 521* (inflorescence in very young fruit).

A species similar to *L. communis* in variation of leaf size and shape, but differing in having more pairs of nerves which are more slender and more nearly at right angles to the mid-rib, a glabrous leaf and veins which stand out yellowish against the green of the leaf. The pistillate inflorescence has very slender peduncles and short pedicelled flowers.

The species is named for Dr. E. D. Merrill, Director of the Arnold Arboretum, whose assistance is indispensable in the preparation of any manuscript dealing with Asiatic plants.

Lindera pedunculata Diels in Bot. Jahrb. **29**: 350. 1901.

Benzoin pedunculatum (Diels) Rehder in Jour. Arnold Arb. **1**: 145. 1919.

DISTRIBUTION: western China (Szechuan, Yunnan).

SZECHUAN: *W. P. Fang 896* (fruit, AA), *844*. YUNNAN: *T. T. Yü 20154*.

Fructus oblongus, ± 9 mm. longus, ± 6 mm. latus, nigrescens, cupula ± 2 mm. longa pubescente ± 5 mm. lata, pedicello ± 6 mm. longo pubescente crassiusculo.

Here also may be placed for the present *Fang 1281*, from Kikiang Hsien, differing in the shorter, thicker, pedunculate umbels and less oblong, more round fruit. It may be a variety, possibly. *Poilane 24561* from Annam has leaves that are heavier, more reticulate and more densely pubescent and the branchlets are stouter. The pedicels are similar to those of *Fang 1281*.

The species has not been taken up, as far as can be ascertained from the literature, since its description, except for the transfer to *Benzoin* in 1919. Its affinity, as Diels suggests, seems to be *Lindera communis*, but it stands apart from that species because of the oblanceolate leaves more or less rounded at the base, and the oblong fruit. No staminate inflorescence has been seen as yet, the type description having been made from a pistillate branch. Just possibly the plant belongs in another genus, *Litsea* for example.

Lindera Duclouxii Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5:** 113. 1913; Liou, Laurac. Chine Indoch. 128. 1932.

Lindera spec. ? in Not. Bot. Gard. Edinb. **14:** (Pl. Chin. Forrest. Edinb.) 276. 1924.

DISTRIBUTION: western China (Yunnan, Tibet).

This is a little known species from Yunnan and Tibet. It is perhaps more closely allied to *L. Nacusua* than to any other species, but differs in having broader leaves usually rounded at the base and frequently unequal. The tip is more abruptly acuminate and the flowers larger, borne on longer pedicels.

Lindera sterrophylla, spec. nov.

Arbor parva vel frutex 2.5–5 m. altus, ramulis teretibus striatis rubescentibus, glabrescentibus demum glabris. Folia alterna, elliptica vel oblongo-elliptica, robusta, coriacea, 10–13 cm. longa et 4–5 cm. lata, acuminata vel abrupte obtuse acuminata, basi acuta, utrinque glabra, supra viridia plus minusve nitida, subtus glauca (fide collectoris), pennivervia, nervis 6–8-jugis utrinque glabris, costa supra glabra basi ad 5 mm. longitudinem pubescente excepta, supra impressis (costa leviter elevata excepta), subtus conspicue elevatis, petiolo 1–1.5 mm. longo canaliculato glabro praeter canaliculum. Umbellae ♂ solitariae, axillares, brevipedunculatae, bracteis deciduis. Flores 3–6, pubescentes, viridescentiflavi (fide collectoris), pedicellis 3–8 mm. longis minute fulvo-pubescentibus, lobis 6 oblongis, staminibus 9, 3 interioribus bi-glandulosis. Umbellae

♀ paucae similes ♂. Flores parvi ± 2 mm. longi, viridescenti-albi (fide collectoris), pedicellis 1–2 mm. longis pubescentibus, lobis 6 oblongo-ovatis, staminodiis 9, 3 interioribus bi-glandulosis. Fructus obovoideus, 10–12 mm. longus, ± 9 mm. diam., cupula pubescente corrugata ± 3 mm. longa et 3–4 mm. lata, pedicello, 2–6 mm. longo pubescente crasso, pedunculo communi ± 3 mm. longo.

DISTRIBUTION: western China (Szechuan).

SZECHUAN: Under woods, Mt. Omei *T. T. Yü 392* (TYPE ♂, AA), April 18, 1932, alt. 1600 m., small tree 2.5 m. high, leaves dark green above, whitish beneath, flower greenish yellow; Mt. Omei *T. T. Yü 404*, April 18, 1932, alt. 1500 m., shrub among woods, leaves dark green above, bluish beneath, flower greenish white (♀, AA); *Yü 188, 393, 396, 416; W. P. Fang 2468*, Mt. Omei, August 4, 1928, alt. 1050–1220 m., shrub 5 m. in thickets, fruit obovate, drupaceous (AA); *W. P. Fang 23238, 23596.*

A species distinct because of the leathery leaves, glabrous and shining above, slightly revolute at the margins. The leaves of the type are broader and more abruptly acuminate at the apex than are those of the other specimens cited but undoubtedly the same. The very small pistillate flowers form a smaller umbel, which is sessile, than those of the staminate inflorescence. The species is similar to *Lindera Duclouxii* from Yunnan and Tibet, but is distinguished at once by its almost complete glabrity.

Lindera umbellata Thunberg, Fl. Jap. 145. t. 21, 1784.

Benzoin umbellatum Rehder in Jour. Arnold Arb. **1**: 146. 1919.
Lindera membranacea Maxim. in Bull. Acad. Sci. St. Petersb. **12**: 72. 1867, in Mél. Biol. **6**: 275. 1868.
For further synonymy, see Rehder, l.c.

DISTRIBUTION: Japan.

JAPAN: *Thunberg* (TYPE of *L. umbellata*, Upsala; photo & fragm. AA); *Tschonoski* (*Maximowicz*, iter secundum) (TYPE of *L. membranacea*, fruit, Leningrad; isotype AA); *Herb. K. Shiota*, No. *41, 48, 6421.* Unfortunately the other collections in the AA Herb. are unnumbered, among which are numerous sheets collected by E. H. Wilson and C. S. Sargent.

The "umbellata" complex might very aptly be termed unfinished business, for a number of reasons. First, some of the species have been described from immature plants or plants with precocious flowers. Second, it is necessary in this group to keep in close touch with Japanese herbaria, for without authentically annotated specimens it is at times

impossible to understand the Japanese authors' concept of species — one of their native species as wide-spread as *L. umbellata,* for example.

The great difficulty in ascertaining the specific limitations of *Lindera umbellata,* as well as *L. Thunbergii* (now segregated as *L. erythrocarpa*), lies in the fact that both of these species were based on specimens in immature stages. One may guess that leaves will at maturity have lost their early pubescence, but it goes without saying that the remaining pubescence, if any, may vary in many ways. The bark of the young specimens of each species is very different. That of *L. umbellata* is smooth, shining, reddish, while that of *L. Thunbergii* (*L. erythrocarpa*) is more rough and is pale grey. The mature specimens could never be confused. *Lindera erythrocarpa* has leaves very long-attenuate at the base, lanceolate-obovate, reddish brown in color, paler on the lower surface and with rough pubescence. The fruit, according to Makino (Tokyo Bot. Mag. **13:** 140. 1899) is scarlet. *Lindera umbellata* has leaves which are less long-attenuate at the base, are broader and usually not reddish, and very sparsely pubescent if at all, on the lower surface. The fruit (see Makino, l.c.) is black. Makino, in 1900, was correct in separating the two entities, giving *L. Thunbergii* the new name *L. erythrocarpa.* (See Makino, l.c., Rehder, l.c.) In 1846, Siebold and Zuccarini described *Benzoin sericeum* with leaves pubescent above and softly villous below, and with new parts white-sericeous, with branchlets blackish fuscous or black, and fruits globose, mucronulate. Blume in 1851, transferred the species to *Lindera* adding a β var. *glabrata* with lanceolate-oblong leaves everywhere glabrous. Makino (1900), made the species a variety of *L. umbellata,* but on careful consideration it appears now to be worthy of specific rank.

At the time of Maximowicz' description of *Lindera membranacea,* he had at hand undoubtedly, the currently known species of *L. umbellata* with which to compare his new species. Hence, his comparison of the broader leaves of *L. membranacea,* with those of *L. umbellata* (probably now Makino's segregate *L. erythrocarpa*), the longer, more slender peduncles and pedicels as opposed to the shorter and thicker peduncles and pedicels of *L. umbellata.* So, it appears from careful examination of the types that the species which Maximowicz describes as new is merely the old *L. umbellata,* and the *Lindera umbellata* to which he compares it the species now known as *L. erythrocarpa.* Thus *L. membranacea* is probably correctly reduced to synonymy under *L. umbellata.*

Lindera umbellata var. **hypoglauca** (Maxim.) Makino in Tokyo Bot. Mag. **14:** 185. 1900.

Lindera hypoglauca Maxim. in Bull. Acad. Sci. St. Petersb. **12**: 71. 1867, in Mél. Biol. **6**: 274. 1868.

Benzoin hypoleucum O. Kuntze, Rev. Gen. **1**: 569. 1891.

Benzoin hypoglaucum (Maxim.) Rehder in Bailey, Cycl. Am. Hort. **1**: 153. 1900.

Benzoin umbellatum var. *hypoglaucum* Rehder in Jour. Arnold Arb. **1**: 146. 1919.

DISTRIBUTION: Japan, and cultivated.

Under this variety the annotated specimens which are available from Japan show a leaf which is much smaller (not more than 7 cm.), usually obtuse or acute, very coarsely reticulate, unmistakably glaucous below, and rather papery in texture. The remainder of the material from Japan was named in America, consists mostly of Wilson's specimens and is indistinguishable from the specimens of *L. umbellata* proper from Japan.

Lindera umbellata var. **pubescens** Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris. sér. v, **5**: 113. 1913; Liou, Laurac. Chine Indoch. 129. 1932.

DISTRIBUTION: western China (Yunnan).

YUNNAN: *J. M. Delavay 4296* (TYPE of *L. umbellata* var. *pubescens*, Paris; photo & fragm. AA).

So far only the type of Lecomte's variety has come to light. It is, unfortunately, a branch in fairly young fruiting stage with leaves seemingly not fully developed. The whole aspect of the plant is suspiciously like that of a *Litsea* in general and of *Litsea sericea* in particular. There are differences which separate it from *Litsea sericea* but it might easily be one of the many species of that genus described from young flowers only.

Lindera erythrocarpa Makino in Tokyo Bot. Mag. **11**: 219. 1897, **13**: 138. 1899.

Benzoin erythrocarpum Rehder in Jour. Arnold Arb. **1**: 144. 1919.

For complete synonymy, see Rehder, l.c.

DISTRIBUTION: Japan, Formosa, Korea, and China.

JAPAN: (TYPE, *Benzoin Thunbergii* S. & Z., Leningrad; isotype, Gray); *Siebold*, as *L. umbellata* Gray; *Maximowicz*, as *L. umbellata* Thunb.; *Herb. K. Shiota, 46, 5517, 5939, 6486, 9662, 9692; T. Tanaka 42 (100185)*.

KOREA: *E. H. Wilson 9445, 9617; E. Taquet 3179*.

FORMOSA: *R. Oldham 446*.

CHINA. Chekiang: *S. Chen 60, 990, 1242, 2785, 2798, 2868,*

3714, 3730, 3909; H. H. Hu 303, 1692; W. C. Cheng 3684; S. S. Chien 735; Y. Y. Ho 913, 1449; Y. L. Keng 1044; R. C. Ching 1421, 1516, 1520, 2496, 2853, 4814, 5009, 5027, 5116, 5144; D. Macgregor, s. n., Ningpo, 1908. Fukien: *R. C. Ching 2505.* Anhwei: *S. C. Sun 1298, 1310, 1416, 1417; R. C. Ching 2853, 3198.* Kiangsu: *R. C. Ching & C. L. Tso 393.* Hupeh: *W. Y. Chun 3649; S. C. Sun 945, 1077, 1118.* Hunan: *W. T. Tsang 23517, 23606.* Kwangtung: *W. T. Tsang 26181.* Kwangsi: *T. S. Tsoong (Z. S. Chung) 81734, 81988; W. T. Tsang 27920.*

The Chinese specimens as a general rule have less grey bark than the typical Japanese material, and the leaves are often somewhat broader with less of a purple tinge below. There is no doubt, however, that they belong in the species.

Lindera sericea Blume, Mus. Bot. Lugd.-Bat. **1**: 324. 1851.

Lindera umbellata var. *sericea* Makino in Tokyo Bot. Mag. **14**: 185. 1900.

DISTRIBUTION: Japan.

JAPAN: *Blume* (TYPE *Lindera sericea,* fruit, Leiden; isotype, NY); specimen from Herb. Lugd.-Bat. in Gray Herbarium labeled *Benzoin sericeum S. & Z.; Herb. K. Shiota 49; K. Ichikawa 112.*

The species, as far as can be determined by the specimens at hand, does not occur in China. The large amount of material assigned to this species in the past, has proved to be *Litsea* and doubtfully *Litsea sericea.* The Chinese specimens (in fruit, of course), at first glance appear to be very much like the Japanese species, but they differ in the lower leaf surface being less pubescent at maturity, the pubescence of the young leaves being very tawny, and the mature leaves being more membranaceous than those of *Lindera sericea.* In shape, the leaves of the Chinese trees are more variable, usually with rounded and smaller leaves intermingled with the large acuminate leaves, and the fruiting pedicels and peduncles are very nearly equal in length, as opposed to the pedicels nearly two times the length of the peduncles in the Japanese species. The description of this new species of *Litsea* appears later in this paper. Most of the currently designated *Lindera umbellata* var. *sericea* from Japan were labeled thus because of the sericeous young leaves. On the same sheet are often mature leaves with scarcely a sign of pubescence except on the lower surface on the veins and the petioles, and that sparse pubescence is not of the soft villous kind to be found on the type of *Benzoin sericeum.* Therefore, these more or less glabrescent immature leaved specimens are undoubtedly true *Lindera umbellata* and not the variety *sericea.*

There is another possibility, which must be considered, and that is that there are perhaps two separate entities — *Lindera sericea* Blume, as outlined above, and distinct *L. umbellata sericea,* which shows little variation from *L. umbellata* proper. More complete and better material from Japan collected in all stages must be available to workers before the question of identities be settled satisfactorily.

Lindera sericea var. *β.* **glabrata** Blume, Mus. Bot. Lugd.-Bat. **1**: 324. 1851.

DISTRIBUTION: Japan.

The variety was under *Benzoin sericea* Blume on sheet from the Herbarium of Buitenzorg, and it may be the basis for all of the specimens labeled *Lindera umbellata* var. *sericea* from Japan. This specimen has smaller, more narrow leaves and is glabrescent. Because it is labeled *L. sericea* it may have been confused with true *L. sericea* of Blume, but might conceivably be his variety *glabrata.* Here also may be placed *A. Henry 79,* and *H. Mayr,* April 4, & June 15, 1886, from Ugo.

Lindera reflexa Hemsley in Jour. Linn. Soc. Bot. **26**: 391. 1891; Liou, Laurac. Chine Indoch. 128. 1932.

Lindera umbellata var. *latifolia* Gamble in Sargent, Pl. Wilson. **2**: 81. 1914.

Benzoin sericeum var. *tenue* Nakai, Fl. Sylv. Kor. **22**: 77. 1939.

For further synonymy, see Liou, l.c.

The type of *Lindera reflexa* is based on a specimen cultivated in the Hongkong Botanic Garden, from the North River above Canton. Most of the leaves on the type are rotundate-ovate, slightly cordate and obtuse, except for the leaves near the tip of the branch, which are obovate to elliptic and rounded at the base. None of the specimens accorded to *Lindera reflexa* exactly match the type, in leaf shape. For the most part, the latter are more acuminate at the apex, acutish at the base and rather elliptic in outline. The habit, pubescence and inflorescence are more stable and do not show such variation. It is a known fact that species in cultivation often show greater variation in young vegetative shoots. Hence, it is with no hesitation that the numbers below, in full leaf or fruit, are placed under *L. reflexa.* The young branchlets showing precocious flowers and very young leaves, however, might belong to any one of a number of species of eastern China. It is anyone's guess where they do belong. Gamble's variety *latifolia* of *Lindera umbellata,* from Hupeh, certainly has nothing to do with the species *L. umbellata.* The venation is of the same type as that of *L. reflexa,* the laterals arising almost horizontally from the midrib. There is less pubescence on Gamble's specimen, but no less than is to be found on many of the

so-called *L. reflexa* specimens. Gamble's variety is undoubtedly a poor specimen of the latter with slight geographical variation.

DISTRIBUTION: China.

KWANGTUNG: Hongkong Bot. Garden, cultivated, from North River, *No. 128* (TYPE of *Lindera reflexa*, Kew; photo & leaf tracing, AA), February 1, 1889; *CCC. 12194; W. T. Tsang 26337.* CHEKIANG: *R. C. Ching 2435, 4786, 4793, 5140, 5183; W. C. Cheng 2107; C. Y. Chiao 1019 (14318), 1044 (14343), 14436; H. H. Hu 1596; S. Chen 369, 495, 1157, 1519, 1676, 3150, 3209, 3679; Y. L. Keng 825, 994; W. Tang & W. Y. Hsia 382.* ANWHEI: *C. S. Fan & Y. Y. Li 164; S. C. Sun 1155; R. C. Ching 2627, 2746, 2820, 3119; S. S. Chien 1016; K. Ling 1151 (7731).* KIANGSI: *N. K. Ip 1064; H. H. Chung & S. C. Sun 337, 463; A. N. Steward 2749; E. H. Wilson 1621, 1632, 1639; A. Allison 10; J. L. Gressitt 1450; H. H. Hu 750 (?); T. H. Wang 232; S. K. Lau 4651.* HONAN: *A. N. Steward 1593 (9719).* HUNAN: *C. S. Fan & Y. Y. Li 156, 476.* HUPEH: *E. H. Wilson 610A* (TYPE of *Lindera umbellata* var. *latifolia*, fruit, Kew; photo & fragm. AA); *W. Y. Chun 5229.* KWEICHOW: *H. Handel-Mazzetti 255 (10765); W. Y. Chun 5782.* KWANGSI: *R. C. Ching 6143; C. Wang 41154; T. S. Tsoong (Z. S. Chung) 82032; W. T. Tsang 27606.* YUNNAN: *H. T. Tsai 57020 (?).*

All of the specimens from China cited by Nakai (see Nakai, l.c.) under *Benzoin sericeum* var. *tenue*, agree with the author's conception of *Lindera reflexa* as discussed above. Chen numbers 1239, 2765, cited by Nakai under *B. sericeum* var. *tenue*, the leaves of which are in very young stage, may be excepted, however, for in that condition it is difficult to determine the species.

Litsea szechuanica, spec. nov.

Arbor vel frutex parvus, 2.5–15 m. altus, ramulis fuscis vel atro-rubescentibus striatis glabris, novellis fulvo-tomentosis. Folia alterna, membranacea, elliptica vel obovata, 4–13 cm. longa et 2–6 cm. lata, rotundata, obtusata, acuta vel acuminata, basi acuta vel cuneata saepe inaequalia (rare, juventate rotundata), supra demum glabrescentia glabra (exceptis venis pubescentibus), viridia (fide collectoris), subtus primo fulvo-tomentosa demum glabrescentia, pallida, glauca, pennivervia, nervis 6–8-jugis supra plus minusve inconspicuis subtus conspicue elevatis dense tomentosis, petiolo (5)–10–15 mm. longo pubescente. Inflorescentiae ♀ axillares. Umbellae ♀ 1–4, bracteis deciduis, pedunculatae, pedunculis 4–8 mm. longis pubescentibus. Flores 4–10 (?), 2–3 cm. longi, flavi (fide collectoris), glabrescentes, pedicellis 4–6

mm. longis gracilibus pubescentibus, lobis 6 oblongo-ellipticis 3 mm. longis, staminodiis 6, 2–(3) bi-glandulosis. Inflorescentiae ♂ axillares (?). Umbellae solitariae (?), bracteis deciduis, pedunculatae, pedunculis 3–4 mm. longis, pubescentibus. Flores 10 (?), 2–3 mm. longi, glabrescentes, pedicellis ± 10 mm. longis pubescentibus, lobis 6 ellipticis vel elliptico-obovatis ± 3 mm. longis, staminibus 9, 3 interioribus biglandulosis. Fructus parvus, subglobosus, breviter apiculatus, nigrescens, 3–4 mm. diam., disco plano haud crasso pubescente 1–2 mm. lato, pedicellis 10–12 mm. longis leviter crassis.

DISTRIBUTION: China (Szechuan, Yunnan, Shensi).

SZECHUAN: Kuan Hsien, Chien-Cheng Shan, *C. S. Fan & Class 139* (TYPE ♀, AA), April 4, 1938, alt. 1000 m., tree in forest, 30 ft. high, fl. yellow; Mt. Omei *F. T. Wang 23151*, July 2, 1931, alt. 1400 m., small tree 20 ft., diam. bh. 4 in., outside of temple, margin of thicket (fruit, AA); *Wang 20595, 20666, 20806, 22737; W. P. Fang 817; T. T. Yü 282, 418, 635, 705; E. H. Wilson 5176; S. S. Chien 5689.* YUNNAN: *H. T. Tsai 55967.* SHENSI: Tsinling-schan, centr. inter. mei et Liupa, in silvis mixtis den clivium *G. Fenzel 507*, May 1934 (♂, AA).

A species, the fruiting specimens of which have been placed under *Lindera umbellata, sericea* and even *glauca*. The very slender evidence that it is not a *Lindera* but a *Litsea* hangs on the dissection of a flower from an almost fragmentary branch tip with the specimen of *Fenzel 507*. Beyond a doubt, the fragment belongs with the rest of the material on the sheet, which matches the other members of the same species. The fulvous pubescence on the underleaf surface, concentrated into a tomentum on the younger parts of the plant, and the very small fruit set this species apart from the species of *Lindera* mentioned above. *Tsai no. 55967* and *Yü 635* and *705* are definitely a variant from the typical *L. szechuanica* and may even be another species. Whether *Lindera* or *Litsea* is impossible to say, because they are pistillate specimens.

There is a residue of specimens left after the disposal of the members of the *Lindera umbellata* complex. Whether they are *Lindera* or *Litsea* is difficult to say, since they are fruiting specimens. They do not match any material or description of known species. There are several species of *Litsea* among them *L. Forrestii* and *L. moupinensis* which were described from precocious flowers alone or flowers and very young leaves. It is anyone's guess what the mature leaves of these species may be. The following numbers are in this dubious position, each group probably representing a species.

YUNNAN: *T. T. Yü 16015.* SZECHUAN: *W. P. Fang 2210, 2863, 2915.* HUPEH: *W. Y. Chun 3888, 3908.*

Lindera tonkinensis Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5:** 112, t. 8. 1913, Fl. Gén. Indoch. **5:** 155, t. 7. 1914; Liou, Laurac. Chine Indoch. 133. 1932.

Lindera tonkinensis is a part of the general complex which holds *Lindera strychnifolia* var. *Hemsleyana* (*L. Hemsleyana*) and var. *velutina,* and *Lindera pulcherrima* (*L. Thomsonii*). *Ching 7863* was placed under *Lindera Chunii* Merrill, in an early determination. It is evident that geographically as well as physically it is distinct, since it occurs only in Indochina, and Hainan and Kwangsi in China. The western Chinese entities are totally different from the former species. The larger leaves which, like those of *L. Chunii,* remain greenish brown on drying, but unlike *L. Chunii,* are not shining but opaque and more membranaceous, acuminate instead of caudate, the total lack of glaucescence or pubescence on the lower leaf surface, the entirely basal origin of the lateral nerves, as opposed to their arising several millimeters above the base. These are characters which readily separate *Lindera tonkinensis.*

DISTRIBUTION: French Indo-China and China.

FRENCH INDO-CHINA. Tonkin: *E. Poilane 25194, 25306bis.* Annam: *Poilane 19850; F. Evrard 2134.* Laos: *E. Poilane 20029.*

CHINA. Kwangsi: *R. C. Ching 7863.* Hainan: *F. C. How 72649, 73790; C. Wang 36364.* Yunnan: *C. W. Wang 72833, 73258; J. F. Rock 2759, 2795; H. T. Tsai 53242; A. Henry 11686, 11686A, B, D.*

Lindera pulcherrima (Wallich) Hooker f., Fl. Brit. Ind. **5:** 185. 1886, p.p.

Daphnidium pulcherrimum (Wall.) Nees in Wall. Pl. As. Rar. **2:** 63. 1831, Syst. Laurin. 610. 1836.
Tetranthera pulcherrima Wall. Num. List. 2567A, 1830, nomen nudum.
Benzoin pulcherrimum O. Kuntze, Rev. Gen. **2:** 569. 1891.

DISTRIBUTION: India.

INDIA: Nepal, *Wallich 2567A,* in 1821 (TYPE of *Tetranthera pulcherrima,* Kew; isotype, Gray).

The true *Lindera pulcherrima* of Wallich and Nees, based on *Wallich 2567A* from Nepal, has oblong-lanceolate leaves measuring 10–15 cm. long and 2–4.5 cm. wide, with a slender cauda measuring sometimes as

much as 2–2.5 cm. in length, and glaucous below. The specimens which are at hand representing the type do not have fruit.

Lindera pulcherrima var. **attenuata**, var. nov.

A typo differt foliis lanceolatis concoloribus, apice attenuatis interdum subcaudatis, plus minusve manifeste 3-pli-nerviis, pedicellis brevioribus.

DISTRIBUTION: southwestern China (Kwangsi, Kweichow, Hunan, Hupeh, Kwangtung).

KWANGSI: Kwei-lin District, Hsi-chang village and vicinity, Ch'i fen-shan, *W. T. Tsang 28435,* October 1–11, 1937, shrub? 6 ft. high, with very young ♀ fls., (AA); Loh Hoh Tsuen, Ling Yün Hsien, *A. N. Steward & H. C. Cheo 79* (TYPE ♂, AA), March 23, 1933, forest alt. 1880 m., shrub 3 m. high, flowers yellowish; *Steward & Cheo 363; S. K. Lau 28806; T. S. Tsoong* (*Z. S. Chung*) *83332.*

The Chinese material representing this variety, except for *Steward & Cheo 79* (♂ fl.) and *Tsang 28435* (♀ fl.), is in the fruiting stage. It differs from the species in having leaves less oblong and more narrowly ovate-lanceolate, with very attenuated tips hardly caudate as in *L. pulcherrima.* Considerable variation in leaf shape and size occurs but its presence is typical of this extremely variable group of plants. The variety may very possibly represent another species but because of the scarcity of material it seems advisable to designate it as a variety for the present. The last cited specimens have smaller leaves than the type, but they seem to belong in this category.

HUNAN: *C. S. Fan & Y. Y. Li 264; Handel-Mazzetti 670* (*11107*) (fruit, AA), in monte Yün-schan prope urbem Wukang, in silva elata frondosa umbrosa copiose, alt. 900–1400 m. July 20, 1918, frutex aromaticus. HUPEH: *E. H. Wilson 3725.* KWANGTUNG: *S. P. Ko 52948.*

Lindera pulcherrima var. **glauca** Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 117. 1913; Liou, Laurac. Chine Indoch. 135. 1932.

DISTRIBUTION: French Indo-China.

Only a photo of this variety is available. However, it seems to have been segregated, not from the true *L. pulcherrima,* but from the Hooker & Thomson specimen included in the latter (Hook. f., Fl. Brit. Ind. **5**: 185. 1886). It has the look of belonging with the species described below, but the description of Lecomte is scant and until the type itself is examined, no further disposition can be made.

Lindera Thomsonii, spec. nov.

Lindera pulcherrima Hooker f., Fl. Brit. Ind. 5: 185. 1886, p.p.

Arbor vel frutex 4–9 m. altus, ramulis teretibus striatis griseis vel rubescentibus glabris novellis dense sericeis exceptis, lenticellis conspicuis. Folia alterna, elliptica vel ovata, chartacea, 7–11 cm. longa et 2.5–4.5 cm. lata, longe caudata, cauda usque 3.5 cm. longa, basi acuta vel cuneata, utrinque glabra, bene reticulata, supra ± nitida, subtus glauca, 3-nervia, nervis utrinque conspicuis elevatisque, circa 5–9 mm. supra basim laminae divergentibus, saepe nervis lateralibus conspicuis supra medium laminae, petiolo usque 1.5 cm. longo glabro. Umbellae ♂ plerumque axillares, solitariae, brevipedunculatae, bracteis deciduis glabris. Flores 3–10, pubescentes, flavi (fide collectoris), 5–6 mm. longis, pedicellis 3–4 mm. longis fulvo-pubescentibus, lobis 6 oblongo-lanceolatis vel ovato-lanceolatis ± 3–5 mm. longis, staminibus 9, ± 4.5 mm. longis exsertis, 3 interioribus bi-glandulosis, ovario pubescente. Umbellae ♀ axillares, bracteis deciduis. Flores 4–12, pubescentes, albi, flavi vel viridescenti-flavi (fide collectoris), ± 3 mm. longis, pedicellis 4–5 mm. longis gracilibus fulvo-pubescentibus, lobis 6 oblongis ± 2 mm. longis, staminodiis ± 6, 1–2 plus minusve petaloideis, ovario ellipsoideo pubescente. Fructus ellipsoideus, 5–6 mm. longus, ± 3 mm. latus, nigrescens, disco parvo inconspicuo glabro, pedicello leviter crasso ± 1 cm. longo.

DISTRIBUTION: India, French Indo-China and China.

INDIA: Khasia: *J. D. Hooker & T. Thomson,* regio temp. alt. 5–7000 ft., (TYPE, fruit, Gray). Upper Burma: *F. K. Ward 9381, 9325; J. F. Rock 7409.*

FRENCH INDO-CHINA: Tonkin, *E. Poilane 19108.*

CHINA. Yunnan: Shweli River drainage basin and environs of Tengyueh, *J. F. Rock 8007* (TYPE ♂, AA), February 1923, shrub or small tree with yellow flowers; Chen Kang Hsien, near by village, *C. W. Wang 72528* (♀, AA), March 1936, alt. 2000 m., tree? 4 m. high, flowers greenish yellow; *C. W. Wang 72474; G. Forrest 9517, 26243, 26259; H. T. Tsai 56361, 56362; A. Henry 9629.* SZECHUAN: *E. Faber 242.*

A species exceedingly variable in leaf shape, except for the drip-tip, which is constant throughout. The leaves are conspicuously reticulate after the pattern of all leaves of this group. Hooker placed his specimen from Khasia under *L. pulcherrima* amending the original description to include it. Subsequent workers have done likewise until *L. pulcherrima* has become even more variable as a species and its range

been extended to include all of southeastern Asia. All of these broader and shorter elliptic leaved caudate specimens, however, belong under *L. Thomsonii*. The young leaves and stems are tawny-sericeous but lose their pubescence early, the lower surface of the leaves being glaucous at maturity. Both the pistillate and staminate flowers are tawny-pubescent, the staminate being larger throughout and more pubescent.

The following numbers in fruiting stage are probably variations within the species of *L. Thomsonii*. KWANGSI: *S. P. Ko 56028*. YUNNAN: *T. T. Yü 17089, 17267; C. W. Wang 67078, 67304, 67350*.

The species is named for Mr. T. Thomson, co-collector with J. D. Hooker in India.

Lindera urophylla (Rehder), comb. nov.

Benzoin urophyllum Rehder in Jour. Arnold Arb. **1**: 146. 1919; Chun in Contr. Biol. Lab. Sci. Soc. China 1^5: 52. 1925.

Lindera caudata Diels in Engl. Bot. Jahrb. **29**: 352. 1901, non (Nees) Ktze.

DISTRIBUTION: western China (Szechuan, Kweichow).

SZECHUAN: *C. Bock & A. v. Rosthorn 781* (TYPE of *Lindera caudata*, Berlin; photo & fragm., AA); *Y. Liu 1424*. KWEICHOW: *Y. Tsiang 6457*.

A species as yet known only in the fruiting stage. The plant is slender, glabrous throughout and the leaves have the patterned reticulation and drip-tip usual for this group. The leaves are almost membranaceous, are pale green and strikingly glaucous below.

Lindera subcaudata (Merr.) Merrill in Philip. Jour. Sci. **15**: 237. 1919; Liou, Laurac. Chine Indoch. 133. 1932.

Neolitsea subcaudata Merrill in Philip. Jour. Sci. **13**: 137. 1918.

Benzoin subcaudatum (Merr.) W. Y. Chun in Contr. Biol. Lab. Sci. Soc. China 1^5: 38. 1925.

DISTRIBUTION: southeastern China (Kwangtung).

KWANGTUNG: *C. O. Levine 1351* (TYPE, fruit, Manila; isotype, Gray, AA); *Merrill 11016; To Kang Peng 2707* (♂, Manila); *C. O. Levine & F. A. McClure 7027; T. M. Tsui 71*.

The species was first described from fruiting specimens only, under *Neolitsea*, but when staminate material was available the new combination under *Lindera* was made. Tsui's specimen from Loh-Fau Shan is a staminate flowering branch. The leaves are more elliptic than oblong and are wider accordingly than are those of the pistillate plant.

Lindera supracostata Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 112. 1913; Liou, Laurac. Chine Indoch. 132. 1932. For further synonymy, see Liou, l.c.

DISTRIBUTION: western China (Yunnan).

YUNNAN: *J. M. Delavay 2579* (SYNTYPE, Paris; isosyntype, AA), *3996; H. T. Tsai 57555, 52939, 57319, 58370; T. T. Yü 8151, 17026; Siméon Ten 577; A. Henry 10873; G. Forrest 10615, 27394; E. E. Maire 228, 465.*

A striking species with very pale green 3-nerved acuminate leaves shining above and conspicuously reticulate in the pattern usual for the group, with costa and laterals very prominently reticulate; below, nervation less conspicuous, but the veins standing out yellowish against the glaucous background. There is a tendency toward a rhomboid base, pronounced in some leaves and scarcely discernible in others on the same branch. Frequently the tendency is manifest only in a slight inequality at the base of the leaf. *Yü 17026* has leaves smaller in the main and more bluntly and abruptly acuminate than those of the other specimens, but none the less certainly belongs with *L. supracostata.*

Lindera supracostata var. **attenuata,** var. nov.

A typo differt foliis tenuioribus attenuatioribus angustioribus.

DISTRIBUTION: western China (Yunnan, Szechuan).

YUNNAN: *G. Forrest 11110* (TYPE ♀, AA); between Likiang, Tungshan, Tuinaoko, and Tsilikiang, dry Yangtze drainage basin, *J. F. Rock 9783* (fruit, AA), May 1923, alt. 9000 ft., shrub 8–10 ft.; *H. T. Tsai 57336.* SZECHUAN: *C. Schneider 754.*

Differs only in the more narrow and more attenuate leaves, not surpassing 2.3 cm. in width. The tendency toward a rhomboid base is less apparent than in the species.

Lindera Vernayana, spec. nov.

Frutex parvus, ramulis teretibus griseis gracilioribus primo adpresse pubescentibus demum glabris. Folia alterna, membranacea, elliptica, 7–9 cm. longa et 2–3 cm. lata, longe caudata, cauda ± 2 cm. longa, saepe falcata, basi acuta, pallide viridia, supra opaca, glabra, bene reticulata, subtus tota facie breviter adpresse argenteo-sericea, 3-nervia, nervis utrinque conspicuis, circa 1–2 mm. supra basim laminae divergentibus, petiolo 5–(9) mm. longo tenui glabrescente demum glabro. Umbellae ♂ axillares, brevi-pedunculatae, bracteis deciduis. Flores 5–8, sparse pubescentes, pedicellis 1–2 mm. longis tenuibus pubescentibus, lobis 7–8 ellipticis extus sparse pubescentibus, staminibus 9. Umbellae ♀ et fructus ignoti.

DISTRIBUTION: Upper Burma and China.

UPPER BURMA: Panwa Pass, *F. K. Ward* (*Vernay-Cutting Exped.*) *405* (TYPE, AA), March 15, 1939, evergreen forest, alt. 2135 m., small shrub with leaves silver beneath with appressed silky hairs.

CHINA: Yunnan, *H. T. Tsai 55976.*

A new species at first glance difficult to separate from *Lindera Thomsonii* and *L. Hemsleyana* var. *velutina.* The more slender, pale grey branchlets, narrower leaves with shorter appressed silky pubescence, persisting in the flowering stage on adult leaves, distinguish it easily. It is named for Mr. Vernay, who with Mr. Cutting made possible the recent expedition into Burma.

Lindera Hemsleyana (Diels), comb. nov.

Lindera strychnifolia F.-Vill. var. *Hemsleyana* Diels in Bot. Jahrb. **29**: 352. 1901; Gamble in Sargent, Pl. Wilson. **2**: 83. 1914; Liou, Laurac. Chine Indoch. 136. 1932.

Lindera strychnifolia var. ? Hemsl. in Jour. Linn. Soc. Bot. **26**: 392. 1891.

Benzoin strychnifolium O. Ktze. var. *Hemsleyanum* (Diels) Rehder in Jour. Arnold Arb. **1**: 145. 1919; W. Y. Chun in Contr. Biol. Lab. Sci. Soc. China 1^5: 41. 1925.

DISTRIBUTION: southeastern China.

For years this entity has persisted as a variety of *L. strychnifolia,* with which it actually has very little in common. The latter species is affiliated with the group which contains *L. Chunii, L. caudata,* etc. which for the most part lacks the striking, patterned reticulation apparent on the upper surface. With the elevation of this variety to specific rank and the acknowledgment of a variety or so in conjunction with it, it is to be hoped that this particular section of the genus will become less confusing in the future.

The species is distinct from the others in the group for the almost velutinous lower leaf surface, which on older branchlets becomes merely glaucous, and for the acuminate rather than caudate leaf tips.

Lindera Hemsleyana var. **velutina** (Forrest), comb. nov.

Lindera strychnifolia F.-Vill. var. *velutina* Forrest in Not. Bot. Gard. Edinb. **13**: 166. 1921.

DISTRIBUTION: China (Yunnan) and Upper Burma.

CHINA. Yunnan: *G. Forrest 15928* (SYNTYPE, Edinb.; isosyntype, AA); *17658* (SYNTYPE, Edinb.; isosyntype, AA); *J. F. Rock 7631; C. W. Wang 72058.*

UPPER BURMA: *F. K. Ward* (*Vernay-Cutting Exped.*) *430, 457.*

It seems that this species, as viewed from description and the two syntypes available, is hardly velutinous on the lower leaf surface but rather more sericeous. The long silky hairs apparent in early stages become sparse and dark with age, until on the older branchlets there is only an occasional patch of hairs left to indicate the former heavy pubescence. This last feature, the variety has in common with its erstwhile species *L. strychnifolia*.

Lindera Stewardiana, spec. nov.

Arbor vel frutex 5 m. altus, ramulis teretibus, novellis angulatis striatis in sicco rubro-brunnescentibus (griseis fide collectoris) glabris. Folia alterna, lanceolata vel lanceolato-elliptica, subcoriacea, 9–12 cm. longa et 2.5–4 cm. lata, plus minusve acuminata, basi acuta, utrinque glabra, supra conspicue reticulata, nitida, viridia, subtus glauca, 3-nervia (haud 3-pli-nervia), nervis supra plus minusve conspicuis subtus prominenter elevatis, petiolo 1–1.5 cm. longo glabro. Inflorescentiae numerosae axillares, umbellatae. Umbellae ♂ 2–6–(?), subsessiles vel brevipedunculatae, bracteis rotundatis vel ovatis argenteo-sericeis deciduis. Flores 4–7–(?), pubescentes, flavi, fragrantes (fide collectoris), pedicellis 3–5 mm. longis dense ferrugineo-pubescentibus, lobis 6 ellipticis subaequalibus ± 2.5 mm. longis, staminibus 9 exsertis ± 4.5–5 mm. longis, 3 interioribus bi-glandulosis. Fructus immaturus, ellipsoideus, apiculatus, disco pubescente, plano haud crasso, pedicello 7–10 mm. longo pubescente leviter crasso.

DISTRIBUTION: western China (Kwangsi).

KWANGSI: *A. N. Steward & H. C. Cheo 3* (TYPE ♂, AA), Loh Hoh Tsuen, Ling Yun Hsien, March 12, 1933, alt. 1150 m., brushy rocky slope, tree 5 m. high, fl. yellow, fragrant, bark grey, leaves used for making incense; valley in Chin-Tong, *Steward & Cheo 397*, alt. 1300 m., ? vine on tree? (young fruit, AA); *R. C. Ching 5835; S. P. Ko 55793*.

A beautiful species striking because of the luxuriance of the staminate flowers and the shining leaves, glaucous on the lower surface. It is near *L. pulcherrima* from India. The infrutescence also is as abundantly full-fruited and consists of as numerous umbels accordingly as the inflorescence of the staminate branchlets. The other specimens cited do not have such an abundance of fruit as the type material. *Steward and Cheo 397* on the field label gives the information that the plant is a vine on a tree. Undoubtedly, there must have been an error in copying, for the specimen is certainly from a tree or at least a shrub.

The species is named for Dr. A. N. Steward, senior collector of the type and Professor of Botany at Nanking University.

Lindera Gambleana, spec. nov.

Arbor parva, 1.5–6–(9) m. alta, ramulis teretibus striatis fuscis, novellis pallide virescentibus glabris. Folia alterna, lanceolato-oblonga vel lanceolato-elliptica, subcoriacea, 8–12 cm. longa et 2–4.5 cm. lata, acuminata, basi acuta vel cuneata, utrinque glabra, supra viridia, subtus glauca (fide collectoris), 3-pli-nerviis, nervis supra minus conspicuis quam subtus, subtus elevatis circa 3–5 mm. supra basim laminae divergentibus, supra medium nervis ca. 1–2 lateralibus subtus conspicuis, petiolo 1–1.5 cm. longo glabro. Inflorescentiae ♂ numerosae, axillares umbellatae. Umbellae 2–6–(?), subsessiles vel brevi-pedunculatae, pubescentes, bracteis deciduis pubescentibus. Flores 4–8–(?) pubescentes, flavescenti-albi (fide collectoris), pedicellis 3–4 mm. longis dense fulvo-pubescentibus, lobis 6 oblongis ± subaequalibus ± 4 mm. longis, staminibus 9 ± 3.5 mm. longis, 3 interioribus bi-glandulosis. Umbellae ♀ 1–3, brevi-pedunculatae, bracteis plus minusve persistentibus. Flores 4–8–(?), pubescentes, flavescenti-albi vel viridescenti (fide collectoris), brevi-pedicellati, pedicellis ± 1 mm. longis pubescentibus, lobis 6 oblongis ± 2.5 mm. longis, staminodiis 9, ovario obovoideo glabro. Fructus ignotus.

DISTRIBUTION: western China (Szechuan).

SZECHUAN: Mt. Omei, *T. T. Yü 495* (TYPE ♂, AA), April 22, 1932, alt. 2400 m., mt. slope among conifers, tree 12 ft., leaves dark green above, bluish beneath, flowers yellowish white; Mt. Omei, *T. T. Yü 494* (♀, AA), April 22, 1932, under Abies forest, tree 20 ft., d.b.h. 5 in., bark dark grey, leaves dark green above, bluish beneath, flowers yellowish white; *Yü 384, 487; E. H. Wilson 5181; W. P. Fang 2268* (?); *F. T. Wang 23152, 23152 C* (?).

A species near *Lindera Stewardiana,* but separated by firmer, 3-pli-nerved leaves not shining above, with less prominent reticulation and more prominent lateral veins on the lower surface above the middle of the leaf. The flowers are less abundant with shorter pedicels and more appressed pubescence on the lobes.

The species is named in honor of Dr. J. S. Gamble, who determined the Lauraceae of E. H. Wilson's western Chinese collections published in Sargent's Plantae Wilsonianae.

The following specimens are listed as possibly being the fruiting specimens of *L. Gambleana.* There are differences apparent in the near-caudate rather than acuminate tip, the tendency toward smaller leaves in some cases and in others larger leaves. Perhaps some of these are variations typical of the pistillate tree. There are undoubtedly more

than one entities represented here, but they cannot be separated without the study of more representative material.

Kwangsi: *C. Wang 40997.* Szechuan: *F. T. Wang 23264; T. T. Yü 373, 447; C. Y. Chiao & C. S. Fan 301.* Yunnan: *H. T. Tsai 52325, 52280, 54801, 56605, 58416; T. T. Yü 20412.*

Lindera Gambleana var. **floribunda**, var. nov.

A typo differt ramulis novellis dense fulvo-sericeis, junioribus pubescentibus, foliis subtus velutinis, petiolis pubescentibus, floribus numerosis dense aggregatis, pedicellis ± 4 mm. longis.

Distribution: western China (Yunnan).

Yunnan: *G. Forrest 9773* (type ♂, AA); *G. Forrest 7585* (young fruit, AA), *9621; T. T. Yü 16395* (?).

A very attractive tree particularly when young branchlets are growing out, but undoubtedly a variety of *L. Gambleana.* In the abundance of inflorescences both staminate and pistillate it recalls *L. Stewardiana,* but is quickly discernible from the species by the pubescence on the lower leaf surface.

Lindera strychnifolia F.-Vill. in Blanco, Fl. Filip. ed. 3, Nov. Append. 182. 1880; Liou, Laurac. Chine Indoch. 136. 1932. For further synonymy see Liou, l.c.

Distribution: eastern Asia and the Philippines.

There has long been confusion centering about this species, and related species such as *L. caudata, L. Chunii, L. rufa, L. Eberhardtii,* and *L. Playfairii.* All species have more or less ovate leaves which are long-acuminate to extremely long-caudate, glaucous or pubescent below, tri- or tri-pli-nerved. These characters intergrade with a facility that renders clear-cut definition of the species very difficult. All the above mentioned species are distinguished from *L. strychnifolia* proper by the fact that in the latter species the leaves are always ovate-rotund. *Lindera strychnifolia* var. *Hemsleyana* (*L. Hemsleyana*) and var. *velutina,* together with their related entities, belong in a group distinct from and never confused with the "caudata" complex. The leaves of the former are usually prominently reticulate on the upper surface, and the transverse veins, parallel with each other and oblique to the midrib and two laterals, form a distinct pattern peculiar to the group and lacking in the "caudata" complex. These species and varieties are being discussed below.

Lindera caudata Hooker f., Fl. Brit. Ind. **5:** 184. 1886; Liou, Laurac. Chine Indoch. 133. 1932. For further synonymy, see Liou, l.c.

DISTRIBUTION: India, French Indo-China, and China.

FRENCH INDO-CHINA. Laos: *E. Poilane 25617.* Cochinchina: *F. Evrard 1988, 2252.*

CHINA. Kwangsi: *R. C. Ching 6834, 7948; W. T. Tsang 22121, 22242, 22621, 23983, 24680.*. Yunnan: *T. T. Yü 16236.*

Lindera caudata is separated easily by its 3-nerved, always pubescent leaves, in which the three nerves are very prominent and pubescent in all stages, persisting to near the tip of the leaf. The leaf itself is more often oblong-elliptic than ovate. In spite of the name, the species is more long-acuminate than definitely caudate. The branchlets and petioles are pubescent and the umbels sessile.

Lindera rufa Gamble in Jour. As. Soc. Bengal. **75:** 200. 1912; Liou, Laurac. Chine Indoch. 132. 1932. For further synonymy see Liou, l.c.

DISTRIBUTION: Malaya and China?

Reported by Liou from Kweichow. The species can be set apart by its ovate, long-acuminate leaves which are tawny-villous when young, becoming glaucous with age. The petioles are persistently pubescent. The nervation is 3-pli-nerved, the nerves fading out above the middle of the leaf. The young branchlets and buds are densely ferrugineous-tomentose, the pubescence later becoming darker. *Poilane 975* from French Indo-China may belong here. The leaves are more 3-nerviate than 3-pli-nerviate and may or may not be glaucous underneath, after losing their early tawny or pale-ferrugineous pubescence.

Lindera Chunii Merrill in Lingnan Sci. Jour. **7:** 307. 1929; Liou, Laurac. Chine Indoch. 133. 1932.

DISTRIBUTION: southeastern China.

Lindera Chunii stands out among these species because of the bright green upper surface of the leaves and the lower surface covered with closely appressed dense silvery, golden or coppery pubescence, the color depending on the age of the branch at the time of gathering. The leaves are definitely caudate and 3-pli-nerved. The umbels are truly pedunculate.

KWANGSI: *T. S. Tsoong (Z. S. Chung) 82186.* KWANGTUNG: *W. Y. Chun 6327* (TYPE ♀, Manila; isotype, AA).

Lindera Playfairii (Hemsl.) Allen in Ann. Missouri Bot. Gard. **25:** 400. 1938 (preprint 1937).

Litsea? Playfairii Hemsl. in Jour. Linn. Soc. Bot. **26:** 384. 1891.
Neolitsea Playfairii (Hemsl.) Chun in Contr. Biol. Lab. Sci. Soc. China.

1⁵: 66. 1925; Liou, Laurac. Chine Indoch. 145, t. 1932.

Lindera alongensis Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 118. 1913.

DISTRIBUTION: China and French Indo-China.

CHINA. Kwangtung: *G. M. Playfair* (TYPE *Litsea? Playfairii*, ♂ Kew; photo & fragm. AA). Kwangsi: *H. Y. Liang 69330; F. C. How 73871.*

FRENCH INDO-CHINA. Tonkin: *H. Lecomte & A. Finet 823* (TYPE of *L. alongensis* Paris; photo, AA).

The two species *L. Playfairii* and *L. alongensis* are conspecific, as far as can be told from the descriptions and photographs of the types available. The type of *L. Playfairii* is staminate, while that of *L. alongensis* is pistillate.

Lindera Eberhardtii Lecomte in Nouv. Arch. Mus. Hist. Nat. Paris, sér. v, **5**: 115. 1913, Fl. Gén. Indoch. **5**: 156. 1914; Liou, Laurac. Chine Indoch. 135. 1932.

DISTRIBUTION: French Indo-China.

The species differs from *Lindera Playfairii* in that the leaves are pilose as well as glaucous below. The nervation, according to Lecomte, is 3-nerved, like that of *L. Playfairii* and his *L. alongensis*, but the nerves arise a few millimeters above the base. It differs from *L. rufa* in the absence of ferrugineous pubescence on the young leaves and branchlets.

Lindera flavinervia, spec. nov.

Arbor 9–15 m. alta, ramulis angulatis striatis rugosis fuscis, glabris. Folia alterna, late elliptica, membranacea, 6–12 cm. longa et 3.5–6.5 cm. lata, acuta vel breviter acuminata, basi rotundata vel cuneata, utrinque glabra, supra bene reticulata, viridia, subtus pallida vel leviter glauca, 3-nervia, nervis utrinque conspicuis elevatisque flavis circa 5–9 mm. supra basim laminae divergentibus, ± 6 nervis lateralibus plus minusve conspicuis, petiolo 1.5–2.5 cm. longo glabro. Umbellae ♂ plures, axillares, subsessiles, bracteis deciduis. Flores parvi, ± 6, glabri, virides (fide collectoris), pedicellis ± 5 mm. longis minute pubescentibus, lobis 6, 3 interioribus ovato-ellipticis ± 3–4 mm. longis, 3 exterioribus late ovatis ± 1.5–2 mm. longis, staminibus 9, parvis inclusis, 3 interioribus bi-glandulosis. Fructus subglobosus, ± 8 mm. diam., nigrescens (viridis, fide collectoris), cupula glabra 2–3 mm. longa ± 4 mm. lata, pedicello ± 8 mm. longo, crasso. Umbellae ♀ immaturae.

DISTRIBUTION: China (Yunnan).

YUNNAN: Mienning, Hopientsun, *T. T. Yü 18160* (TYPE ♂, AA),

Nov. 2, 1938, alt. 2100 m., tree 4.5–6 m. high, flower green, common among forest; Chenkang, Snow Range, Tapingchang, *Yü 17245*, Aug. 6, 1938, at 2350 m. alt., tree 9–15 m. high, common among forest (fruit, AA).

Near *Lindera fruticosa* Hemsl.[1] but differing in abundant, many flowered sessile inflorescences with short-pedicelled flowers, thicker leaves with distinct venation, and more numerous lateral veins. Also, the small glabrous flowers with the three inner lobes nearly twice as large as the three outer ones, set the species apart at once.

Here tentatively might be placed *C. W. Wang No. 73085* from Shung-Kiang on mountain slope at 2200 m. altitude. The specimen has leaves less distinctly veined, larger and less firm, but the general habit and fruit indicate an affiliation with *Lindera flavinervia*.

Herbarium, Arnold Arboretum,
Harvard University.

[1] *Lindera fruticosa* Hemsl. in Jour. Linn. Soc. Bot. **26**: 388. 1891; Allen in Ann. Missouri Bot. Gard. **25**: 399. 1938 (preprint 1937).

PLANTAE PAPUANAE ARCHBOLDIANAE, V*

E. D. MERRILL AND L. M. PERRY

RUTACEAE

IN THIS PAPER we propose only to record a number of apparently new species and a few range-extensions which have appeared in our effort to name the Rutaceae (excluding the Aurantioideae) of the Archbold collections. By far the major part of the material belongs to the *Evodia-Melicope-Acronychia* group of genera. Although, in Engler's classification, the last genus is placed in another section (with indehiscent fruit) far from the *Evodia-Melicope* relationship, it is to be remembered that species have been transferred from both of these genera to *Acronychia*. In most instances it has been relatively easy to separate *Evodia* from *Melicope*, the former having only four stamens, the latter eight. Unless the fruit is fully mature, the genus may be distinguished from the number or the position of the stamens persisting somewhere on the infructescence. To separate *Acronychia* with dehiscent fruit is another problem. Here are either four stamens (as in *Evodia*) or eight (as in *Melicope*) with filaments glabrous or hairy within toward the base. After scanning our meager material and the descriptions of the species from Australia and Polynesia included in *Acronychia*, it seemed the one differential character was probably the compound ovary. Yet, after examining the collections from the Solomon Islands, some of which show fruits with carpels united to the apex and more or less deeply lobed, others with carpels united halfway to the apex, some with four stamens, others with eight, and some staminate material with rudimentary carpels below the level of the disk, we have decided that our material is too scanty for us to make more than a provisional assignment. We believe this material to be more closely allied to *Evodia* and *Melicope* than to *Acronychia*, although possibly it belongs to a section of *Acronychia* with small flowers and thin dehiscent capsules.

Zanthoxylum L.

Zanthoxylum Dominianum nom. nov.

Fagara varians Domin, Bibl. Bot. **89**: 846. 1927.

BRITISH NEW GUINEA: Western Division, Lower Fly River, east

*(Botanical Results of the Richard Archbold Expeditions) See Jour. Arnold Arb. **20**: 324–345. 1939; op. cit. **21**: 163–200, *t. 1.* 1940; op. cit. 292–327; op. cit. 511–527.

bank opposite Sturt Island, *Brass 8060,* October 1936, common on ridges in rain-forest (weak undergrowth tree 2–3 m. high; leaves aromatic; flowers white); Wassi Kussa River, Tarara, *Brass 8507,* December 1936, common at margin of rain-forest (shrub or small tree 1.5–5 m. high, leaves greyish above; flowers white).

These staminate collections appear to agree reasonably well with Domin's description of this Queensland species. One leaf of *Brass 8060* has a terminal leaflet 18 cm. long, 7 cm. broad, but both plants are surely conspecific and the other number falls well within the limits of *Z. Dominianum.* This species is very closely allied to the Malaysian *Z. ovalifolium* Wight. The specific name *varians* is pre-empted in the genus *Zanthoxylum.*

Zanthoxylum Rhetsa (Roxb.) DC. Prodr. **1:** 728. 1824; Merr. Enum. Philip. Fl. Pl. **2:** 327. 1923.

Fagara Rhetsa Roxb. Fl. Ind. **1:** 438. 1820; Koord. & Val. Atlas Baumart. Java **2:** *t. 352.* 1914.

Solomon Islands: Ysabel Island, Sigana, *Brass 3449,* January 1933, alt. 100 m., hill rain-forests (large wide spreading tree with pale fissured bark and very bright yellow wood; leaves with pale nerves; flowers white).

We have assigned this collection to the Malaysian *Zanthoxylum Rhetsa* (Roxb.) DC. as interpreted in its broader sense. Possibly more mature material will prove it to be a distinct species.

Belonging in this same alliance but surely not identical with it is the following collection from British New Guinea: Western Division, Mabaduan, *Brass 6491,* April 1936, very common monsoon-forest substage tree (20 m. high, crown somewhat spreading; bark pale brown, inner bark and wood yellow; lower part of stem covered with large limpet-like thorny processes; small red aromatic fruit; seeds black). The fruit is about 7 mm. long, the epicarp is densely glandular-pustulate; the thorny processes are 3–3.5 cm. diameter at the base; the leaves have 5–8 pairs of obliquely ovate to elliptic leaflets.

Zanthoxylum conspersipunctatum sp. nov.

Arbor gracilis, 5 m. alta; ramulis parce aculeatis; foliis 2–4-jugis, pari- atque impari-pinnatis; petiolo ac rhachi 6.5–19 cm. longis, glabris; foliolis petiolulatis (petiolulis 3–6 mm. longis), tenuiter coriaceis, superioribus oblongis, inferioribus ovato-ellipticis, 4–12 cm. longis, 1.5–4 cm. latis, basi oblique rotundatis ad suboblique cuneatis, apice acuminatis (acumine ± 1 cm. longo), margine crenulatis, utrinque

glabris, consperse pellucido-punctatis (glandulis magnis, interdum sine lente manifestis), costa subtus prominente; venis primariis utrinsecus 9–11, patenti-adscendentibus, prope marginem arcuatim anastomosantibus, supra manifestis subtus perspicuis; venulis laxe reticulatis, utrinque ± manifestis; paniculis terminalibus, quam foliis brevioribus, glabris; pedicellis brevissimis; calyce ultra medium 4-lobato, lobis vix 1 mm. longis, ovatis, acutiusculis; petalis 4 mm. longis, vix 1.5 mm. latis; staminibus 4 cum petalis alternantibus; filamentis 3.5 mm. longis, subapplanatis; antheris ellipsoideis, 2 mm. longis; ovario ovato, disco inconspicuo obtuso, 1 mm. longo; stylo terminali sed excentrico, brevissimo.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11579* (TYPE), November 1938, alt. 2300 m., one plant in forest undergrowth (slender tree 5 m. high; flowers white).

The species belongs to the section *Blackburnia* (Forst.) Engler. The leaves are mostly even pinnate, exceedingly variable in size, but all have the somewhat scattered large pellucid glands. Possibly its alliance is with *Z. parviflorum* Bentham.

Evodia Forst.

Evodia Forst. with 33 already published species is the largest genus of the Rutaceae in Papuasia. We add here 12 more species. Lauterbach's key to the genus is divided into series based on foliar characters. In our material it appears as if a fairly logical division of the genus might be made on the size of the flowers and the cocci. The latter in the larger-flowered species are often sericeous-pubescent within.

Evodia oligantha sp. nov.

Arbor parva, 3–5 m. alta; ramulis novellis obtuse quadrangularibus, valde compressis, glabris, in sicco rubiginosis; foliis ternatis; petiolo 1–1.5 cm. longo, glabro, supra applanato; foliolis petiolulatis (petiolulis circiter 4–6 mm. longis, glabris, canaliculatis), coriaceis, olivaceis, late lanceolatis vel leviter oblanceolatis, 3.5–7 cm. longis, 1.5–3 cm. latis, basi acute cuneatis, apice acutiusculis vel breviter obtuse acuminatis, utrinque glabris, novellis copiose glanduloso-punctatis; venis primariis utrinsecus 8–12, supra inconspicuis, subtus manifestis, subhorizontalibus prope marginem arcuatim anastomosantibus; venulis laxe reticulatis; paniculis axillaribus, 5–8 cm. longis, paucifloris, habitu subumbellatis; pedunculis 3.5–5 cm. longis; ramulis brevibus, basi bracteatis (bracteis foliiformibus, usque 2 cm. longis, 7 mm. latis, basi angustatis); pedicellis 4 mm. longis, glabris; sepalis liberis, concavis, late rotundatis, 3 mm.

longis, 4 mm. latis, glanduloso-pustulatis; petalis 6–7 mm. longis, 3 mm. latis, apice inflexo-apiculatis, extus consperse glanduloso-pustulatis, intus basim versus puberulis; staminibus circiter 5 mm. longis, filamentis ad basim (1 mm. latis) parce pilosulis, ad apicem (0.6 mm. latis) glabris, antheris 1.5 mm. longis; disco glabro, crasso, 1 mm. alto; carpellis 4, usque ⅓ longitudinem connatis, glabris; stylis connatis, 0.5 mm. longis, glabris; stigmate capitato, inconspicue 4-lobato.

Netherlands New Guinea: Lake Habbema, *Brass 9365* (type), August 1938, alt. 3225 m., one of the smaller and least common trees in closed forest (3–5 m. high; flowers green).

This interesting species is readily distinguished from the other members of the genus in New Guinea by the long-peduncled and relatively few-flowered inflorescences with leaf-like bracts subtending the short branches, and by the almost glabrous floral parts.

Evodia crispula sp. nov.

Arbor probabiliter; ramulis ad apicem minute tomentosis, mox glabratis, ad nodos valde compressis; foliis ternatis; petiolo 4–8 cm. longo, supra subcanaliculato, tomentuloso ad glabrato; foliolis petiolulatis (petiolulis 5–9 mm. longis, canaliculatis, tomentulosis), coriaceis, ellipticis (in specimine typico 9–14 cm. longis, 3.5–7 cm. latis), basi subrotundatis vel obtusis, interdum cuneatis, apice acuminatis, minute pellucido-punctatis, supra glabris, subtus praecipue in costa atque venis primariis crispule stellato-pilosulis; venis primariis utrinque 14–16, supra impressis, subtus prominulis, oblique adscendentibus, prope marginem arcuatim confluentibus; venulis vix manifestis; paniculis saepissime ex axillis foliorum delapsorum ortis, 5–7 cm. longis pedunculo 2–2.5 cm. longo incluso, multifloris; axi, ramulis pedicellisque tomentulosis ad dense puberulis; sepalis 1.2 mm. longis, ad basim connatis, apice rotundatis, puberulis; petalis 5 mm. longis, 3 mm. latis, apice inflexo-apiculatis, extus puberulis, intus dense sericeo-pubescentibus; staminibus 4, filamentis 8–9 mm. longis, intus in parte inferiore piloso-tomentulosis; antheris circiter 2 mm. longis; disco vix 1 mm. alto, tomentoso, subangulato; ovario 4-partito, villosulo; stylo 4.5 mm. longo, pubescente; fructibus ignotis.

Northeastern New Guinea: Morobe District, Ogeramnang, *Clemens 6357* (type), *5155*, May and January 1937, alt. ± 1750 m.

Possibly *Clemens 5921*, Ogeramnang, and *Clemens 2238*, Quembung, also belong here. Both have very immature flowers; the leaves are much larger (13–19 cm. long, 7.5–9.5 cm. broad) but similar in outline and in the somewhat crisped stellate pubescence on the lower surface.

The flower of *Evodia crispula* is very much like that of *E. trichopetala* Lauterb. in that the petals are hairy on both sides, the lower half of the inner surface of the filaments is clothed with more or less tangled hairs, the disk is tomentose and the carpels are short villous. The latter species, however, is glabrous in all the vegetative characters.

Evodia trichopetala Lauterb. Nov. Guin. **14:** 139. 1924.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh 10457, 10457a, Brass 10709,* October 1938, alt. 2830 m., 2750 m., 2800 m. respectively, common in secondary forest (tree 12–18 m. high; flowers red); Bele River, 18 km. northeast of Lake Habbema, *Brass 11378,* November 1938, alt. 2200 m., secondary rain-forest near river (tree 10 m. high; flowers red).

These collections have elliptic rather than lanceolate leaflets, sepals almost 2 mm. long and a style only 3 mm. long. Yet, in view of the agreement of the other floral and foliar characters with the original description, we have assigned the collections to this species. The fruit of *10457a* is about mature. The cocci, 8 mm. long, are already open, the exocarp is 1 mm. thick, closely and longitudinally rugose, glabrous and densely glandular, the inner surface of the endocarp is yellowish with a sericeous pubescence. The seeds are black, shining, 5 mm. long, and somewhat obliquely ovoid.

Possibly *Brass & Versteegh 11998* also belongs here. The specimen shows young fruit. The leaflets are lanceolate, not so distinctly coriaceous, and dull.

Evodia rosea sp. nov.

Arbor; ramulis teretibus ad nodos leviter compressis, glabris, innovationibus minute pubescentibus, mox glabratis; foliis ternatis; petiolo 3–6 cm. longo, puberulo vel glabro, supra applanato; foliolis pedicellatis (pedicellis 6–15 mm. longis), chartaceis ad subcoriaceis, oblongo-ellipticis ad obovato-ellipticis, 6–12 cm. longis, 3–6 cm. latis, basi cuneatis, apice obtusis vel rotundatis, utrinque (maturis) glabris; venis primariis utrinsecus 10–14, manifestis (non prominulis), oblique adscendentibus, prope marginem arcuatim confluentibus; venulis reticulatis, leviter manifestis; paniculis axillaribus, praecipue ex axillis foliorum delapsorum ortis, usque 5 cm. longis latisque; axi superiore, ramulis pedicellisque fulvo-puberulis; pedicellis ± 5 mm. longis; sepalis ad basim connatis, 1.5 mm. longis, ovatis, obtusiusculis, utrinque puberulis; petalis 4 mm. longis, 2 mm. latis, apice inflexo-apiculatis, extus puberulis, intus basim versus minute pubescentibus; filamentis 6 mm. longis, intus basim versus pubescentibus; antheris 1.4 mm. longis; disco crasso.

tomentoso; carpellis 4, tomentosis; stylo 3 mm. longo, minute piloso; fructibus ignotis.

British New Guinea: Western Division, Wassi Kussa River, Tarara, *Brass 8553* (type), December 1936, in rain-forest (common canopy tree; bark soft, corky, deeply fissured; flowers pink); Oriomo River, Wuroi, *Brass 5851,* January–March 1934, alt. 1030 m., common in rain-forest and scattered occasionally on savannah (tree 25 m. high, with gray channelled bark; flowers dark pink to almost white, profusely flowering; nectar copious).

This species closely approaches the very sketchy description of *Evodia altissima* Baker f. It differs in having rounded or obtuse leaflets (not acuminate), panicles mostly below the leaves, flowers about the size of those on a specimen we have determined as *E. Forbesii* Baker f., and stamens finely pubescent toward the base of the inner face of the filament.

Evodia cladantha sp. nov.

Arbor 21 m. alta; ramulis ad apicem velutinis, angulatis, ad nodos valde compressis, interdum sulcatis; foliis ternatis; petiolo 9–11 cm. longo, supra applanato, velutino; foliolis sessilibus, chartaceo-coriaceis, ellipticis vel oblongo-ellipticis (terminali 18–25 cm. longo, 9–11 cm. lato; lateralibus 12.5–17.5 cm. longis, 7–9 cm. latis), basi rotundatis ad subcordatis, apice abrupte acuminatis (acumine ± 1 cm. longo) ac cuspidatis, supra fuscis, praecipue secus costam nervosque minute pubescentibus, subtus pallidioribus, subvelutinis; venis primariis utrinsecus 12–20, supra manifestis, subtus prominulis, oblique patentibus, prope marginem arcuatim anastomosantibus; venulis reticulatis, supra inconspicuis, subtus manifestis; paniculis lateralibus, e ramis circiter 1.5 cm. diametro ortis, ± 5.5 cm. longis, 6 cm. latis (pedunculo 1.5–2.5 cm. longo), multifloris; axi, ramulis pedicellisque tomentulosis; sepalis 1 mm. longis, subrotundatis, pubescentibus vel tomentulosis; petalis 5 mm. longis, 2 mm. latis, apice inflexo-apiculatis, intus basim versus minute pubescentibus, caetera glabris; staminibus glabris, filamentis 11 mm. longis, antheris 2 mm. longis; disco dense tomentoso, 1 mm. alto; ovario villoso; stylo 11 mm. longo, glabro; fructibus ignotis.

Netherlands New Guinea: Bernhard Camp, Idenburg River, *Brass & Versteegh 14003* (type), April 1939, alt. 70 m., frequent tree in the primary forest of the flood-plain (21 m. high, 43 cm. diameter; bark 8 mm. thick, gray, rough, fissured; wood white; flowers rose).

Among the larger-flowered species of *Evodia,* this species is best characterized by the lateral inflorescences, the velutinous young branchlets, and the sessile leaflets with rounded bases, acuminate apices and the soft pubescence on the lower surface of the lamina.

Evodia eriophylla sp. nov.

Arbor 24 m. alta; ramulis apicem versus ± obtuse angulatis, ad nodos valde compressis, innovationibus fulvo-tomentosis, mox glabratis; foliis ternatis; petiolo 3–4 cm. longo, glabrato, supra applanato; foliolis brevissime pedicellatis (pedicellis 3–6 mm. longis, fulvo-tomentosis ad glabratis), crasse coriaceis, obovato-oblongis, 9–17 cm. longis, 4.5–6.5 cm. latis (in parte latissima), basi acute cuneatis, apice obtusis acumine brevissimo praeditis, supra glabris, subtus dense fulvo-tomentosis, costa venisque primariis supra impressis, subtus prominentibus; venis primariis utrinsecus 18–23, adscendentibus, ad marginem arcuatim confluentibus; venis reticulatis, utrinque submanifestis; paniculis axillaribus, usque 17 cm. longis, 14 cm. latis (pedunculis circiter 8 cm. longis); axi, ramulis pedicellisque minute tomentosis ad glabratis; pedicellis 3 mm. longis; sepalis vix 2 mm. longis, subrotundatis, puberulo-tomentosis; petalis anguste imbricatis, late ellipticis, 4 mm. longis, 2.5 mm. latis, apice inflexo-apiculatis, extus glabris, intus praecipue basim versus pilosis vel breviter villosis; staminibus glabris; filamentis 4 mm. longis, ad basim dilatatis; antheris 1.5 mm. longis, connectivo fusco; disco breviter villoso; ovario 4-partito, subgloboso, breviter villoso, 1 mm. alto; stylo 1.2 mm. longo, glabro; stigmate capitato, indistincte 4-lobato.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh 10459* (TYPE), October 1938, alt. ± 2850 m., rare in old secondary forest (tree 24 m. high, 37 cm. diameter; bark 5 mm. thick, soft brown; wood white; flowers white).

This species agrees with several features of the description of *Evodia pachypoda* Lauterb. Nevertheless, the leaflets of the latter are subsessile with a subrounded base, and the lower surface particularly on the nerves is tomentose (this statement would seem to indicate a difference in the amount of pubescence on the nerves and on the blade between), the sepals are acute, and the petals are densely villous within. In *E. eriophylla,* on the other hand, the leaflets are very short petiolulate with a distinctly cuneate or acute base, the lower surface of the leaf is covered with a fine close tomentum (this appears to be easily rubbed off the nerves, particularly the midrib), the sepals are rounded and the petals pilose or very short villous only on the lower part of the inner surface.

Evodia Elleryana F. v. Muell. var. **tetragona** (K. Sch.) W. D. Francis, Kew Bull. **1931:** 189.

SOLOMON ISLANDS: Malaita, Quoi-mon-apu, *Kajewski 2323,* December 1930, alt. 50 m., common in rain-forest; Ysabel, Tasia, *Brass*

3289, December 1932, common in lowland rain-forests (tree attaining 15 m.; bark pale pinkish gray; flowers pink, usually on branches below the leaves).

Previously reported from New Guinea and the Bismarck Archipelago.

Evodia cuneata sp. nov.

Arbor parva; ramulis (fragmento tantum viso) glabris; foliis ternatis; petiolo 9 cm. longo, glabro, supra applanato; foliolis subsessilibus, tenuiter coriaceis, obovatis, 14–24 cm. longis, 10–16 cm. latis (lateralibus paullo inaequilateralibus), basi cuneatis, apice rotundatis vel acumine brevissimo praeditis, utrinque glabris; venis primariis utrinsecus 10–13, supra impressis, subtus prominentibus, oblique adscendentibus, prope marginem arcuatim confluentibus vel curvatis et evanescentibus; venulis inconspicuis; paniculis axillaribus (ante anthesim tantum), circiter 13 cm. longis, multifloris; axi puberulo; ramulis pedicellisque dense puberulis; sepalis rotundatis (interdum acutiusculis), 1–1.5 mm. longis, puberulis; petalis 3.5 mm. longis, 2.5 mm. latis, extus glabris, intus dense breviterque villosis; staminibus glabris; disco dense pubescente; carpellis 4, dense pubescentibus; stylo glabro, 1.5 mm. longo; stigmate capitato, indistincte 4-lobato; fructibus ignotis.

Northeastern New Guinea: Ogeramnang, *Clemens 4895* (type), January 1937, alt. 1650 m., in forest (small tree with bright pink flowers).

This species is perhaps near *Evodia Bonwickii* F. v. Muell. and *E. pachypoda* Lauterb. It differs from both in the large glabrous obovate leaflets with rounded or almost apiculate apices.

Evodia Bonwickii F. v. Muell. Fragm. Phytogr. Austr. **5**: 56. 1865; F. M. Bail. Queensl. Fl. **1**: 200. 1899; C. T. White, Contr. Arnold Arb. **4**: 47. 1933.

British New Guinea: Lower Fly River, Sturt Island, *Brass 8159*, October 1936, plentiful in flood-plain rain-forest (very large, buttressed, canopy tree with thick hard shallowly fissured brown bark and coarse-grained pale wood; leaves stiff, nerves pale; fruit green, gland-dotted; seeds smooth, black).

Although we have no fruiting material with which to compare this collection (in full fruit), it seems to correspond reasonably well with a flowering specimen from the Atherton Tableland, Queensland. The remnants of petals found among the cocci are about the same size and have a villosity similar to those of the Australian material. It is to be noted that only the larger leaves of the Papuan plant (leaflets 8–17 cm.

long, 5–9.5 cm. broad) fall within the range of leaf-size given in the description of the Australian species. Possibly the leaflets of the Papuan collection are a little more coriaceous.

Evodia vitiflora F. v. Muell. Fragm. Phytogr. Austr. **7**: 144. 1871; F. M. Bail. Queensl. Fl. **1**: 201. 1899; C. T. White, Contr. Arnold Arb. **4**: 48. 1933.

BRITISH NEW GUINEA: Western Division, Upper Wassi Kussa River (left branch), *Brass 8635*, January 1937, in rain-forest (large canopy tree; bark gray, suberose, fissured; wood pale, aromatic; leaf-venation conspicuous on the upper surface; flowers white). Previously known from Australia.

Evodia phanerophlebia sp. nov.

Arbor parva, 6 m. alta; ramulis teretibus ad nodos leviter compressis, glabris, innovationibus stellato-puberulis; foliis ternatis; petiolo 4.5–9 cm. longo, glabro vel puberulo, supra ad apicem subcanaliculato; foliolis petiolulatis (petiolulis 0.5–1.2 cm. longis, canaliculatis, glabratis), chartaceis, subfalcato-oblongis vel obovato-oblongis, 7–13.5 cm. longis, 2.5–6 cm. latis (lateralibus paullo inaequilateralibus), basi acutis vel cuneatis, apice acuminatis (acumine usque 1.5 cm. longo), novellis parce puberulis, mox glabratis; venis primariis utrinsecus 8–12 oblique patenti-adscendentibus, prope marginem arcuatim conjunctis, supra leviter impressis, subtus prominentibus; venulis reticulatis, supra obscuris, subtus manifestis; paniculis axillaribus, usque 13 cm. longis, ramosis; axi, ramulis, bracteis, pedicellis calycibusque minute stellato-puberulis; pedicellis circiter 1 mm. longis; petalis 1.5 mm. longis, 0.8 mm. latis, glabris; staminibus brevissimis, 0.6 mm. longis; disco glabro; ovario distincte 4-partito, dense stellato-pubescente; stylo circiter 1 mm. longo, basim versus stellato-puberulo; stigmate 0.8 mm. lato, 4-lobato; coccis subglobosis, 3 mm. diametro, glabratis, minute pustulato-glandulosis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12200* (TYPE), January 1939, alt. 1700 m., in rain-forest seral growths (small tree 6 m. high; leaf-nerves impressed above, prominent below; flowers white).

Evodia phanerophlebia shows some resemblance to *E. Bismarckii montium* Lauterb., but the leaflets are smaller, shorter petiolulate and practically glabrous; the panicles are axillary rather than terminal, and the disk of the flower is glabrous. In only one other specimen we have found a similar stigma with distinctly spreading lobes.

Evodia asteridula sp. nov.

Arbor circiter 8 m. alta; innovationibus, ramulis, petiolis, petiolulis, axi ramulisque inflorescentiae atque bracteis dense minuteque stellato-pilosis; ramulis teretibus, nodis compressis; foliis ternatis; petiolo 5.5–11 cm. longo, ad apicem canaliculato; foliolis subsessilibus (petiolulis 1–2 mm. longis), chartaceo-coriaceis, ellipticis (terminali 12–20 cm. longo, 6–11 cm. lato, lateralibus 8.5–16 cm. longis, 5–10.5 cm. latis), basi subrotundatis, apice breviter acuminatis (acumine 1–1.5 mm. longo); costa ac venis primariis supra parce, subtus ± dense minuteque stellato-pilosis; venis primariis utrinsecus 12–16, supra perspicuis, subtus prominulis, patentibus, prope marginem arcuatim conjunctis; venulis reticulatis, utrinque manifestis; paniculis axillaribus, circiter 15 cm. longis, ramosis, multifloris; floribus in ramulis brevibus confertis, breviter pedicellatis (pedicellis 0.5– vix 1 mm. longis, glabris); sepalis circiter 0.5 mm. longis, basi connatis, subrotundatis, ciliolatis; petalis glabris, 1.2 mm. longis, 0.6 mm. latis, apice inflexo-apiculatis; staminibus glabris, filamentis 1.5 mm. longis, antheris 0.5 mm. longis; disco glabro; ovario pubescente, 4-partito; stylo 1 mm. longo, glabro; fructibus ignotis.

Netherlands New Guinea: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13282* (type), March 1939, alt. 850 m., in flood-plain rain-forest (tree 8 m. high; flowers white).

In some respects this species suggests *Evodia Radlkoferiana* Lauterb. It differs, however, in the elliptic leaflets, the minute stellate pubescence, and the very short petiolules. Among the collections examined, the dense but tiny crisp stellate hairs of *Evodia asteridula* give the species a distinctive appearance.

Evodia Radlkoferiana Lauterb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee Nachtr. 281. 1905, Bot. Jahrb. **55**: 239. 1918.

Evodia lamprocarpa K. Schum. l.c. 280, 239 (fide Lauterb.).

Solomon Islands: Bougainville, Kupei Village, *Kajewski 1723*, April 1930, alt. 750 m., in rain-forest (tree up to 20 m. high, with minute cream flowers, and cocci in fours, threes, twos, and single, the latter 3 mm. long and 2 mm. diameter, seed shiny black); Malaita, Quoimonapu, *Kajewski 2361* (excluding fruit), December 1930, alt. 200 m., rain-forest on mountain (tree up to 20 m. high; buds only); Guadalcanal, Uulolo, Tutuve Mountain, *Kajewski 2516*, January 1931, alt. 1200 m., in rain-forest, common as a regrowth tree, also found in primeval forest (tree up to 15 m. high; flowers white).

Another collection, Bougainville, Kugumaru, Buin, *Kajewski 183* June 1930, alt. 150 m., in rain-forest (tree 15 m. high; flowers whit faintly scented), is more pubescent than the others and with slightl larger flowers; the fruit is less mature but a little more pubescent ar compressed. We doubt that it is specifically different. All the colle tions fall within the range of the descriptions of *Evodia Radlkoferian* Lauterb. Unfortunately we have no authentic material for compariso The species has not previously been reported from outside New Guine

Evodia papuana sp. nov.

Arbor 6 m. et ultra alta; ramulis ad nodos leviter compressis, glabri novellis puberulis vel minute pubescentibus; foliis ternatis; petio 3–8 cm. longo, glabro, supra applanato; foliolis petiolulatis (petiolul ± 3 mm. longis, glabris), chartaceis vel subcoriaceis, lanceolatis a ellipticis, 7–16 cm. longis, 2.5–5.5 cm. latis, basi acutis vel obtusis, api acuminatis (acumine 0.5–1 cm. longo), utrinque glabris; venis primari utrinsecus 11–14, oblique patentibus, prope marginem arcuatim anast mosantibus, manifestis; venulis reticulatis, subaequaliter manifesti paniculis axillaribus ± 10 cm. longis, multifloris; axi, ramulis ped cellisque puberulis; pedicellis ± 1 mm. longis; sepalis ad medium co natis, 0.6 mm. longis, acutiusculis; petalis vix 2.5 mm. longis, api inflexo-apiculatis, glabris; staminibus glabris; filamentis 2 mm. longi antheris 1.2 mm. longis; disco glabro, vix 0.4 mm. alto; ovario puberul 4-partito; stylo 1 mm. longo, glabro.

BRITISH NEW GUINEA: Western Division, Upper Wassi Kussa Riv (left branch) *Brass 8646* (TYPE), January 1937, rain-forest substa (tree 6–7 m. high; leaves anise-scented; flowers white); Oriomo Rive Wuroi, *Brass 5719*, January–March 1934, alt. 10 m., common light rain-forest (slender small tree; leaves anise-scented; flo ers white); Central Division, Ononge River, Dieni, *Brass 400* April–May 1933, alt. 500 m., rain-forest (loosely branched tree 12 high; bark brown, fissured; flowers white); Kubuna, *Brass 557* November 1933, alt. 100 m., common in forest on low ridges (tr 15–20 m. high; leaves dark, glossy, 3-foliolate; small white flowers).

Of the descriptions of New Guinea species of *Evodia,* the materi cited above most closely approaches *E. anisodora* Lauterb. & K. Schu The collections are relatively uniform and give no indication of t presence of single leaflets, the trifoliolate ones are consistently small (than those of *E. anisodora* Lauterb. & K. Schum.) and distinct acuminate, the net-veining of the leaves is almost as manifest as t primary veins and the inflorescence is puberulous.

Evodia simulans sp. nov.

Arbor parva; ramulis teretibus, nodis leviter compressis, glabris; foliis ternatis; petiolo 3.5–6.5 cm. longo, glabro, supra applanato; foliolis subsessilibus (petiolulis 1.5–2.5 mm. longis, parce pilosulis), chartaceo-coriaceis, oblongo-ellipticis, 6–17 cm. longis, 2.5–6.5 cm. latis, basi obtuse cuneatis vel subrotundatis, apice acutis vel acuminatis, utrinque glabris; venis primariis utrinsecus 11–16, oblique patentibus, supra saepe impressis, subtus prominulis; venulis reticulatis, utrinque manifestis; paniculis axillaribus, 10–14 cm. longis, ramosis; axi, ramulis bracteisque substellato-puberulis; floribus in ramulis brevibus confertis, breviter pedicellatis (pedicellis vix 1 mm. longis, glabris); sepalis 0.4 mm. longis, ovatis, basi connatis, acutiusculis, fere glabris; petalis 1.4 mm. longis, ellipticis, apice inflexo-apiculatis, parce glandulosis; staminibus 2–2.5 mm. longis, filamentis glabris, subfiliformibus, antheris 1 mm. longis; disco glabro, parvo (0.2 mm. alto); ovario hirtello, inconspicue 4-partito, 0.5 mm. alto; stylo 0.8 mm. longo, glabro; fructibus non visis.

Northeastern New Guinea: Ogeramnang, *Clemens 6040* (type), *5412*, March and February 1937, alt. 1750 m.

Among the described New Guinea species of *Evodia*, this appears to be most like *E. Schraderi* Lauterb., but the leaflets have short petiolules, the petioles and the pedicels are glabrous, and the petals are sparsely glandular.

?**Evodia Peekelii** Lauterb. Bot. Jahrb. **55**: 227. 1918; Kaneh. & Hatus. Bot. Mag. Tokyo **52**: 409. 1938.

Solomon Islands: Bougainville Island, Karngu, Buin, *Kajewski 2281*, October 1930, rain-forest at sea-level; Kupei Gold Field, *Kajewski 1682*, April 1930, rain-forest, alt. 50 m.; Kieta, *Kajewski 1610*, March 1930, alt. 100 m.

The field notes indicate a common tree 15–20 m. high. *Kajewski 2281* is a fruiting specimen with capsule very shallowly 4-lobed; *Kajewski 1682* is in flower (♀), the four carpels are united, glabrous, and project above the disk; *Kajewski 1610* has a staminate inflorescence, the pistil is rudimentary and sunk in the centre of the disk. Known previously from the Bismarck Archipelago. Possibly this belongs to *Acronychia*.

Evodia solomonensis sp. nov.

Arbor usque 12 m. alta; ramulis novellis pubescentibus vel breviter tomentosis, mox glabratis; foliis trifoliolatis; petiolo 8–18 cm. longo, minute tomentoso ad glabrato; foliolis petiolulatis (petiolulis 3–6 mm.

longis, canaliculatis, minute tomentosis ad glabratis), chartaceis, minute pellucido-punctatis, ellipticis vel leviter obovato-ellipticis, 10–21 cm. longis, 6–11 cm. latis, basi cuneatis (lateralibus basi ± inaequalibus), apice breviter acuteque acuminatis (acumine ± 1 cm. longo), utrinque fere glabris, costa atque venis primariis subtus ± pubescentibus; venis primariis utrinsecus 10–16, oblique adscendentibus, ad marginem arcuatim confluentibus, supra manifestis, subtus prominulis; venulis reticulatis, inconspicuis; paniculis axillaribus (subterminalibus), usque 16 cm. longis, breviter tomentosis vel pubescentibus, multifloris, floribus in ramulis confertis; pedicellis brevissimis (0.5–1 mm. longis); calyce 1 mm. longo, ad medium lobato, puberulo-tomentoso, lobis rotundatis; petalis 2.2–2.4 mm. longis, 1.4 mm. latis, apice inflexo-apiculatis, glabris, extus minute consperseque glandulosis; staminibus 4, circiter 2.5 mm. longis; ♂ : disco crasso, lobato, glabro; carpellis liberis, minutis, glabris, in disco immersis; stylis connatis, brevissimis; ♀ disco angusto, glabro; carpellis fere ad medium connatis, glabris; stylis connatis, 2 mm. longis, glabris; stigmate capitato, 4-lobato; fructibus 3 mm. longis, 4 mm. latis; semine 1 mm. lato, 2 mm. longo, subellipsoideo.

SOLOMON ISLANDS: San Cristobal Island, Waimamura, *Brass 2682* (TYPE), August 1932, lowland rain-forests, common (tree 10 m. tall, not much branched; bark thin, brown, aromatic; leaves glabrous, shining; flowers green; fruit immature); Ysabel Island, Tiratona, *Brass 3209*, November 1932, alt. 600 m., mountain rain-forests, common (slender tree 12 m. tall, with close gray bark; leaves pale green, midrib very pale above; flowers cream-colored).

Evodia solomonensis appears to be closely related to *E. Peekelii* Lauterb. The carpels here, however, are only united half way to the apex. The leaflets too are short-petiolulate and cuneate rather than sessile and rounded at the base.

Evodia silvatica sp. nov.

Arbor gracilis; ramulis novellis velutinis; foliis trifoliolatis; petiolo 11 mm. longo, velutino; foliolis petiolulatis (petiolulis 5 mm. longis, subvelutinis, fere canaliculatis), chartaceis, minute pellucido-punctatis, ellipticis, circiter 21 cm. longis, 12 cm. latis, basi breviter cuneatis, apice obtusis, acumine brevissimo (3 mm. longo) praeditis, utrinque (costa supra ± pubescente, subtus tomentosa excepta) glabris; venis primariis utrinsecus ± 14, patenti-adscendentibus, ad marginem curvatis atque inconspicue anastomosantibus, utrinque perspicuis; venulis crebre reticulatis, supra inconspicuis, subtus manifestis; paniculis axillaribus (subterminalibus), 13–14 cm. longis (incl. pedunculo 8 cm. longo), ramulis

brevibus basi bracteis foliiformibus binis praeditis; axi, ramulis bracteisque velutinis; floribus in ramulis confertis; pedicellis circiter 1 mm. longis, minute pubescentibus; calyce ultra medium lobato, minute pubescente, lobis vix 1 mm. longis, triangularibus, acutiusculis; petalis 2.5 mm. longis, apice inflexo-apiculatis, glabris vel extus secus medium puberulis, minute glandulosis; staminibus 4, circiter 3 mm. longis, glabris, antheris 0.5 mm. longis; disco lato, applanato, extus glabro, intus barbato; carpellis minutis, in disco immersis; stylis liberis, brevissimis, glabris.

Solomon Islands: Ysabel Island, Tataba, *Brass 3431* (type), January 1933, alt. 30 m., rain-forests, common (slender second storey tree; leaves pale-nerved; flowers white).

Evodia silvatica is very much like *E. Peekelii* Lauterb. and *E. solomonensis*. It is to be distinguished from both by the velvety pubescence of the new growth, and the disk barbate or hirtellous within. This is probably a staminate inflorescence. The four minute glabrous styles do not protrude beyond the trichomes of the inner part of the disk; the concealed carpels are probably only rudimentary. The inflorescence is young, the bracts at the base of the branches are long and slender simulating a leaf, the lowest ones even have a short stalk.

The name *Evodia coriacea* Merr. Philip. Jour. Sci. **17**: 265. 1920, is invalidated by the earlier *E. coriacea* Lauterb. Bot. Jahrb. **55**: 237. 1918, and should be changed to **E. philippinensis** nom. nov.

Melicope Forst.

Melicope parvifolia sp. nov.

Arbor usque 8 m. alta; ramulis teretibus, novellis obtuse angulatis, in sicco rubescentibus, glabris; foliis unifoliolatis; petiolo 0.3–1 cm. longo, glabro, supra subcanaliculato; foliolo sessili, tenuiter coriaceo, oblongo ad late elliptico, 1–3.3 cm. longo, 0.8–2.2 cm. lato, basi obtuso, apice retuso vel subemarginato, utrinque glaberrimo, minute punctato; costa supra impressa, subtus prominula; venis primariis utrinsecus ± 6, patentibus, prope marginem arcuatim confluentibus, vix manifestis; inflorescentiis axillaribus, glabris, circiter 1 cm. longis, paucifloris (in specimine typico immaturis, 2-floris); pedicellis 2 mm. (fructiferis usque 5 mm.) longis; sepalis basim versus crassis ac connatis, circiter 1.2 mm. longis, exterioribus rotundatis, interioribus obtusiusculis, glabris; petalis . . . . ; staminibus 8, non fertilibus, vix 1 mm. longis; filamentis complanatis, membranaceis, ciliatis; antheris minutis vel nullis; disco an-

gusto, breviter pilosulo; ovario 4-partito, glabro; stylo vix 2 mm. longo, glabro; ovulis superpositis; fructibus 2–4 coccis; coccis liberis, minute glandulosis, compressis, consperse rugulosis, ellipsoideis, 6 mm. longis, 5 mm. latis, vix maturis.

BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4341* (TYPE), May–July 1933, alt. 3680 m., rare in forest (slender tree 4–5 m., branches erect; leaves dark, shining, citrus-like; flowers yellowish; fruit green); Mount Albert Edward, *Brass 4398,* May–July 1933, alt. 3680 m., common in forest (tree 5–8 m. high with straight trunk and ascending branches; leaves gland-dotted, somewhat yellowish beneath; flowers yellow-green; fruit immature). Unfortunately only a couple of flowers are left on the specimens and the petals have fallen from both. Apparently the flowers disarticulate very readily from the axis.

The glabrous character of the plant, the size, and the apparent lack of primary veins in the leaflets, suggest *Evodia aneura* Lauterb. Yet, having 8 stamens, our species surely belongs to *Melicope* Forst. Further *Evodia aneura* Lauterb. has trifoliolate leaves; these specimens have unifoliolate ones.

Melicope sterrophylla sp. nov.

Arbor parva, 3–4 m. alta; ramulis glabris, cinereis, novellis rubiginosis; foliis unifoliolatis; petiolo 0.7–1.2 cm. longo, supra subcanaliculato vel applanato; foliolo sessili, rigide coriaceo, crebre glanduloso-punctato, supra nitido, elliptico ad obovato, 5–8 cm. longo, 3–4 cm. lato, in basim cuneatum angustato, apice rotundato vel retuso, utrinque glaberrimo; costa subtus prominente; venis primariis utrinsecus 8–12 in utraque pagina subaequaliter manifestis, patentibus, fere transversis, in venam submarginalem confluentibus; venulis laxe reticulatis, supra manifestis, subtus leviter manifestis; inflorescentiis subterminalibus (ante anthesim tantum), ± 2 cm. longis, paucifloris (in specimine typico 2-floris), glabris; pedicellis 2 mm. longis; sepalis liberis, 2–3 mm. longis, 3–4 mm. latis, 2 exterioribus paullo brevioribus, margine subhyalinis, minute glandulosis; petalis valvatis, 5 mm. longis, lanceolatis vel ovatis, apice inflexo-apiculatis, minute glandulosis; staminibus 8, 4 brevioribus; filamentis subulatis, extus minute glandulosis, intus (basi glabra excepta) dense barbatis; antheris cordatis, 2–2.5 mm. longis, in staminibus brevioribus apiculatis; disco lobato in parte inferiore glabro, in parte superiore ± piloso-barbato; ovario glabro, 4-partito; stylo brevissimo (circiter 0.5 mm. longo), villoso; stigmate subgloboso, 4-lobato; fructibus ignotis.

British New Guinea: Central Division, Wharton Range, Murray Pass, *Brass 4520* (type), June–September, 1933, alt. 2840 m., in forest borders (small stiffly branched tree 3–4 m.; flowers yellow-green).

Melicope sterrophylla appears to be a very distinct species. We cannot suggest its alliance although the material seems to fall within the generic limits of *Melicope*. Its distinguishing characters are the very stiff leaves, the short and few-flowered subterminal inflorescences, the filaments bearded on the inner face, the large cordate anthers, the short villous style between the glabrous 4-carpelled ovary, and the large globose 4-lobed stigma.

Melicope polyadenia sp. nov.

Arbor usque 10 m. alta; ramulis subteretibus, glabris; innovationibus, ramulis novellis, petiolis foliolisque dense minuteque glanduloso-pustulatis, glabris; foliis unifoliolatis; petiolo circiter 2.4 cm. longo, supra subcanaliculato; foliolo sessili, subcoriaceo, obovato, 7–11.5 cm. longo, 4–5.5 cm. lato, basi cuneato, apice obtuso vel retuso; venis primariis utrinsecus 9–13, oblique patentibus, prope marginem arcuatim anastomosantibus, utrinque manifestis; costa subtus prominente; paniculis 2.5 cm. longis pedunculo 1 cm. longo incluso, glabris, pauci-ramosis, ramis brevissimis (2–3 mm. longis); pedicellis 2 mm. longis; sepalis 2 mm. longis, basim versus connatis, ovatis, acutiusculis, minute glandulosis; petalis 3.5 mm. longis, apice longiuscule inflexo-apiculatis, minute glandulosis; staminibus 8, non fertilibus; filamentis complanatis, longitudinem ovarii fere aequantibus, glabris; antheris minutis; disco vix manifesto; ovario 1.2 mm. longo, 4-partito, minute glanduloso; stylo 1 mm. longo, glabro, stigmate capitato, 4-lobulato; fructibus (uno tantum viso) 4-coccis; coccis dense minuteque glanduloso-pustulatis, oblique ovoideis, apiculatis; semine 4 mm. longo, 3 mm. lato, modice compresso.

British New Guinea: Central Division, Mount Tafa, *Brass 4858* (type), May–September 1933, alt. 2400 m., common in forests (small tree up to 10 m. high; midrib prominent beneath; flowers cream-colored; fruit dark green, seeds black).

This species, in its foliar character, is somewhat like *Melicope sarcococca* Lauterb. It has, however, a shorter panicle, the mericarp is not pedicellate, and the epicarp, although glandular, could scarcely be considered fleshy. The entire new growth is copiously glandular-pustulate. The flowers are probably unisexual, as the anthers are incompletely developed.

Melicope heterophylla sp. nov.

Arbor usque 12 m. alta, glabra; ramulis subteretibus, novellis minute glandulosis; foliis uni- atque tri-foliolatis; petiolo 2–5 cm. longo, canaliculato; foliolis brevissime petiolulatis (petiolulis 1–2 mm. longis), chartaceis vel tenuiter coriaceis, oblongo-ellipticis, 3–7.5 cm. longis, 1–3 cm. latis (lateralibus quam terminali saepe paullo brevioribus), basi obtusis vel cuneatis, apice retusis vel obtusis, utrinque glabris, crebre glanduloso-punctatis; costa supra impressa, subtus prominente; venis primariis utrinsecus 9–11, patentibus, prope marginem arcuatim confluentibus, inconspicuis vel vix manifestis; paniculis axillaribus, plerumque quam petiolo brevioribus, ramulis brevibus (usque 4 mm. longis), paucifloris; sepalis fere ad medium connatis, lobis ovatis, obtusiusculis, 1 mm. longis; ♂ : staminibus 8, filamentis 4 mm. longis, 4 paullo brevioribus, applanatis, glabris, antheris 1 mm. longis; ♀ : staminodiis 8, longitudinem ovarii fere aequantibus, glabris; disco glabro, 0.5 mm. alto; ovario subangulato, glabro; stylo 1 mm. longo; stigmate subgloboso-capitato; fructibus 1–4-coccis, coccis liberis basi connatis, minute pustulatis, subglobosis, 4 mm. diametro; semine 3 mm. diametro.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10296* (TYPE), October 1938, alt. 2800 m., seral growths in a small forest opening (tree 4 m. high; aromatic, flowers white); Bele River, 18 km. northeast of Lake Habbema, *Brass 11417,* November 1938, alt. 2200 m., in a small forest clearing (very slender tree 5 m. high; flowers white); Bele River, *Brass 11529,* November 1938, alt. 2400 m., occasional in forest substage (tree 12 m. high; flowers white).

Melicope heterophylla is perhaps allied to *M. alba* Lauterb., but the petioles are not winged, the leaflets are shorter petiolulate than those of the related species, and oblong-elliptic and retuse or obtuse at the apex, rather than lanceolate and obtusely subacuminate.

Melicope novo-guineensis Val. Bull. Dep. Agr. Ind. Neerl. **10:** 24. 1907, Ic. Bogor. **3:** 195, *t. 274.* 1908; Lauterb. Bot. Jahrb. **55:** 241. 1918, Nov. Guin. **14:** 141. 1924.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7078,* June 1936, alt. 100 m., common in undergrowth of ridge-forests (a small tree 3 m. high; flowers white). NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 13027,* February 1939, alt. 1250 m., rain-forest undergrowth (slender tree 2.5 m. high).

One collection is in flower, the other in fruit; the first has 1-foliolate leaves, the second shows both 1-foliolate and 3-foliolate leaves. Lauter-

bach, in his key to the species of this genus, characterizes the leaves of this species as smooth. Valeton describes the veins on the lower surface as minutely hirsute. The species is very close to *M. papuana* Lauterb.

Melicope clathrata sp. nov.

Arbor 6–9 m. alta; ramulis novellis velutinis; foliis trifoliolatis; petiolo 3–9 cm. longo, velutino; foliolis petiolulatis (petiolulis 1–1.5 cm. longis, velutinis, supra subapplanatis), coriaceis, discoloribus, ellipticis vel obovato-ellipticis, 7–12(–19) cm. longis, 4–7(–10) cm. latis, basi cuneatis vel obtusis, apice obtusis vel ?apiculatis, supra glabris, in costa ± tomentosis, subtus parce tomentosis, in costa tomentosis; venis primariis utrinsecus 15(–18), oblique patentibus, subtus prominentibus, tomentosis; venulis supra inconspicuis, subtus clathrato-reticulatis; paniculis e ramis 8 mm. diametro ortis, multifloris (floribus non visis); fructibus dense confertis; sepalis ovatis, 1 mm. longis, tomentosis; petalis ovatis, acutis, 2 mm. longis, 1.5 mm. latis, extus tomentosis, intus glabris; staminibus 8, ?glabris; fructibus 1–4-coccis; coccis liberis, dense tomentosis, subglobosis, circiter 5 mm. longis, 4 mm. latis, vix compressis; endocarpio soluto; semine 3.5 mm. longo, 3 mm. lato.

Northeastern New Guinea: Morobe District, Ogeramnang, *Clemens 4713* (type), December 1936, alt. 1800 m., in forest with *Podocarpus* and *Dacrydium;* Yunzaing, *Clemens 4101*, September 1936, alt. 1500 m.

Although both these numbers are fragmentary specimens, we have not found any description of a species in which they might belong. Fortunately, upon scanning the fruits we found a few to which the petals and withered stamens were still attached. The description of the flowers of *M. trachycarpa* Lauterb. might fit these specimens, but surely the cocci in our species would not be considered rough, and the characterization of the leaves does not suit this material at all.

Melicope coriacea sp. nov.

Arbuscula 2–4 m. alta; ramulis glabratis, innovationibus tomentosis; foliis trifoliolatis; petiolo 3.5–4.5 cm. longo, minute tomentoso, supra canaliculato; foliolis petiolulatis (petiolulis 1.1–2 cm. longis, subapplanatis, minute tomentosis), coriaceis, discoloribus, ellipticis, 9–14 cm. longis, 5–7 cm. latis, basi obtusis atque leviter decurrentibus, apice acutiusculis (fere obtusis), supra glabris (costa interdum pubescente), subtus ± tomentosis; venis primariis utrinsecus 12–15, supra impressis, subtus perspicuis, patenti-curvatis, ad marginem arcuatim confluentibus; venulis laxe reticulatis, supra subobscuris, subtus manifestis; paniculis in axillis foliorum superiorum (subterminalibus), immaturis, tomentosis;

sepalis tomentosis, fere ad medium connatis, ovatis, circiter 1 mm. longis; petalis oblongis, 2.5 mm. longis, 1.5 mm. latis, utrinque minute tomentosis; staminibus 8, circiter 1 mm. longis; filamentis subulatis, glabris; fructibus 1–4-coccis; coccis basi cohaerentibus, minute tomentosis, subglobosis, apiculatis, ± 4 mm. diametro.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass 4574* (TYPE), June–September 1933, alt. 2840 m., shrubby forest borders (common small tree 2–4 m. with stiff erect branches; leaves pale; flowers and fruit green).

The inflorescences on this specimen show only very young buds. The description of the flower is compiled from the parts attached to the immature fruits.

We have noted two other species, *Melicope reticulata* Lauterb. and *M. perspicuinervia* with petals tomentose on both surfaces. In *M. coriacea* the trichomes on the lower surface of the leaf are not confined to the venation; the fruit is tomentose (not subrugose).

Melicope perspicuinervia sp. nov.

Ramuli tomentosi ad glabrati; foliis trifoliolatis; petiolo 7–11 cm. longo, minute tomentoso; foliolis petiolulatis (petiolulis 6–9 mm. longis, minute tomentosis), chartaceo-coriaceis, discoloribus, oblanceolatis ad oblongo-ellipticis, 14–21 cm. longis, 4.5–7.5 cm. latis (parte latissima ultra medium), basi anguste cuneatis, decurrentibus, apice breviter acuminatis (fere cuspidatis), supra (costa pubescente excepta) glabris, subtus secus costam venasque primarias tomentosis ad glabratis; venis primariis utrinsecus 9–12 patenti-curvatis, marginem versus arcuatim anastomosantibus, supra impressis, subtus perspicuis; venulis laxe reticulatis, subtus subprominulis; paniculis axillaribus ± 8 cm. longis, minute tomentosis, multifloris; floribus non visis; sepalis circiter 1.2 mm. longis, ovatis; petalis circiter 3 mm. longis, utrinque minute tomentosis; staminibus 8, glabris, vix 1 mm. longis; fructibus 1–4-coccis; coccis minute tomentosis, 5 mm. diametro, subapiculatis.

NORTHEASTERN NEW GUINEA: Morobe District, Sarawaket, *Clemens 5556, 5672* (TYPE), April 1937, alt. about 2700 m.

Melicope perspicuinervia is most closely related to *M. reticulata* Lauterb. The cocci of the former are densely short tomentose, and although apparently mature, show no suggestion of rugosity.

Melicope mucronata sp. nov.

Arbor usque 10 m. alta; ramulis ad nodos valde compressis, glabratis, innovationibus dense tomentosis; foliis trifoliolatis atque interdum

unifoliolatis; petiolo 6–17 cm. longo, tomentoso ad glabrato, supra canaliculato; foliolis subsessilibus (petiolulis 2–3 mm. longis, minute tomentosis) chartaceis vel tenuiter coriaceis, anguste ellipticis ad obovato-ellipticis, 9–23 cm. longis, 5–11 cm. latis (terminali quam lateralibus paullo majore), basi longe cuneatis, leviter decurrentibus, apice obtuse cuspidatis vel breviter acuminatis mucronatisque, crebre atro-punctatis supra costa pubescente excepta glabris, subtus secus costam venasque primarias tomentosis ad glabratis; venis primariis utrinsecus 13–18, oblique adscendentibus, marginem versus arcuatim anastomosantibus, supra manifestis, subtus perspicuis; venulis laxe reticulatis, subtus manifestis; paniculis axillaribus, usque 11 cm. longis, multifloris; axi, ramulis pedicellisque pubescentibus; sepalis 1.4 mm. longis, rotundatis, pubescentibus; petalis glabris, 2.5 mm. longis, vix 2 mm. latis, apice leviter inflexo-apiculatis; staminibus 8, ± 2 mm. longis, 4 paullo brevioribus, filamentis glabris, ad basim applanatis; antheris circiter 0.6 mm. longis; disco crasso, 0.5 mm. longo, glabro, sublobato; carpellis 4, minutis, glabris; stylis connatis, brevissimis (vix 0.5 mm. longis), glabris; fructibus 1–4-coccis; coccis liberis, subglobosis, apiculatis, 3–3.5 mm. diametro, glabris, subtransverse costulatis.

Netherlands New Guinea: 9 km. northeast of Lake Habbema, *Brass 10778* (type), October 1938, alt. 2750 m., common in secondary forest (tree attaining ± 10 m.; leaf-nerves impressed above, prominent below; flowers green); Bele River, 18 km. northeast of Lake Habbema, *Brass 11476,* occasional in secondary forest (tree 4 m. high).

In the large leaves with a long cuneate base, this plant suggests *Melicope grandifolia* B. L. Burtt of the Solomon Islands. The leaflets, however, are more nearly sessile, more pubescent, and more distinctly cuspidate in *M. mucronata.*

Melicope macrophylla sp. nov.

Arbuscula 3–5 m. alta; ramulis ad nodos compressis, innovationibus fulvo-pubescentibus; foliis trifoliolatis; petiolo 11–18 cm. longo, glabro; foliolis petiolulatis (petiolulis 2.3–3 cm. longis, supra subapplanatis, glabris), coriaceis, oblongis vel oblongo-ellipticis, 20–33 cm. longis, 8.5–13.5 cm. latis (terminali quam lateralibus paullo majore), basi cuneatis, apice rotundatis vel apiculatis, utrinque glabris, inconspicue glanduloso-punctulatis, supra olivaceo-viridescentibus, subtus brunnescentibus; costa subtus prominente; venis primariis utrinsecus 16–21, patentibus, marginem versus arcuatim anastomosantibus, subtus prominulis; venulis laxe reticulatis, subtus fere prominulis; paniculis axillaribus (novellis velutinis, pedicellis alabastrisque glabris), in fructu 19 cm. longis, multifloris; pedicellis ± 2 mm. longis; calyce fere ad

medium 4-lobato, lobis vix 1 mm. longis, ovatis, acutis; petalis glabris, in alabastro extus minute glandulosis; staminibus 8, 4 brevioribus; ovario 4-lobato, glabro; stylo glabro; stigmate minute 4-lobato; fructibus (probabiliter immaturis) 1–4-coccis; coccis basi cohaerentibus, vix 5 mm. longis, 4 mm. latis, compresse subglobosis, apiculatis, glandulosopustulatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11401* (TYPE), November 1938, alt. 2300 m., forest undergrowth, common in moist sheltered hollows (tree 3–5 m. high; flowers white — young buds only).

Melicope macrophylla, in some characters, approaches *M. iboensis* Lauterb., but in the former the petiolules are much longer, the upper and lower surfaces of the dried leaves are not the same color (this character of like color was emphasized by Lauterbach in the comment following the description of his species), the axis of the inflorescence is velutinous, but the pedicels are glabrous both on the very immature bud and on the fruit.

Melicope solomonensis sp. nov.

Arbor usque 15 m. alta; ramulis minute puberulis vel glabris; foliis trifoliolatis; petiolo 12 cm. longo, glabro; foliolis petiolulatis (petiolulis 5–10 cm. longis, glabris), chartaceis, minute consperseque pellucidopunctatis, fere opacis, oblongo-ellipticis, 15–40 cm. longis, 6–11 cm. latis, basi cuneatis (lateralibus basi inaequalibus), apice breviter acuminatis (acumine 5 mm. longo), utrinque glabris, subtus interdum costa venisque parce minuteque pubescentibus; venis primariis utrinsecus 12–20, oblique patentibus, ad marginem arcuatim confluentibus, manifestis; venulis laxe reticulatis, supra inconspicuis, subtus submanifestis; paniculis axillaribus, usque 19 cm. longis, multifloris; floribus subglomeratis; axi, ramulis pedicellisque minute pubescentibus; calyce 1 mm. longo ultra medium lobato, puberulo; petalis 2 mm. longis, 1 mm. latis, glabris; staminibus 8, glabris; disco crasso, lobato, glabro; carpellis 4, minutis; stylis connatis, brevissimis.

SOLOMON ISLANDS: Guadalcanal, Uulolo, Tutuve Mountain, *Kajewski 2511* (TYPE), April 1931, alt. 1200 m., common in rain-forest (tree up to 15 m. high; flowers white).

The species seems closely related to *Melicope grandifolia* B. L. Burtt; yet it differs in that the leaves are not densely pellucid-glandular, in outline they are oblong-elliptic rather than obovate-lanceolate, the reticulations are lax and inconspicuous, and the flowers are slightly smaller than in *M. grandifolia* B. L. Burtt.

Melicope pubifolia sp. nov.

Arbuscula 3 m. alta; innovationibus, petiolis, petiolulis, axi inflorescentiae ramulisque fulvo-tomentosis; foliis uni- atque tri-foliolatis; petiolo 1.5–3.5 cm. longo, subtereti; foliolis breviter petiolulatis (petiolulis 3–5 mm. longis), tenuiter coriaceis, ellipticis vel interdum leviter obovato-ellipticis (terminali usque 7–8 cm. longis, 4 cm. latis, lateralibus ± 4.5 cm. longis, 2.2 cm. latis), basi obtusis vel cuneatis, apice obtusis, paululo apiculatis, supra puberulis vel glabris, costa pubescente, subtus minute strigillosis, costa venisque primariis tomentulosis; venis primariis utrinsecus 8–10, patentibus, prope marginem arcuatim confluentibus, supra inconspicuis, subtus perspicuis; venulis reticulatis, subtus manifestis; paniculis circiter 7 cm. longis, gracilibus, parce ramosis, paucifloris; pedicellis circiter 3 mm. longis, minute pubescentibus; calyce fere ad medium 4-lobato, minute pubescente, lobis rotundatis, ± 0.6 mm. longis; petalis 2.2 mm. longis, 1.4 mm. latis, apice inflexo-apiculatis, glabris; staminibus glabris, 4 brevioribus; filamentis applanatis, antheris late ellipticis; disco glabro, sublobato; ovario 4-partito, glabro; stylo circiter 0.2 mm. longo; fructibus 1–4-coccis; coccis liberis, 5 mm. longis, 3.5 mm. latis, rotundatis, minute pustulatis, glabris, leviter rugulosis; semine circiter 4 mm. longo.

Netherlands New Guinea: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12697* (type), February 1939, alt. 2150 m., in mossy forest seral growths (tree 3 m. high; flowers white; fruit red).

The best characters of this species are the tawny pubescence, the shape of the leaflets, the prominent primary veins on their lower surface, and the slender sparsely branched inflorescences with few flowers.

Tetractomia Hooker f.

Tetractomia Hook. f. Fl. Brit. Ind. **1**: 490. 1875.

Terminthodia sensu Ridley, Trans. Linn. Soc. Bot. II. **9**: 24. 1916; Lauterb. Bot. Jahrb. **55**: 245. 1918, Nov. Guin. **14**: 142. 1924, Bot. Jahrb. **59**: 535. 1925; Engler, Nat. Pflanzenfam. ed. 2, **19a**: 230. 1931; vix Ridley 1915.

Glancing over the Rutaceae preparatory to studying the material of this family in the Papuan collections, we were impressed by the resemblance of specimens labelled *Tetractomia* Hook. f. to those we had accepted as *Terminthodia* Ridley. A further scrutiny of seven Malaysian species (among them *Tetractomia Roxburghii* Hook. f., one of the original species of the genus) failed to reveal any generic differences in the specimens at hand. A brief review of the literature shows that

(probably on account of the floral character: 8 stamens, 4 perfect, 4 imperfect) Engler, Nat. Pflanzenfam. 3(4): 122. 1895, reduced Hooker's genus to a section of *Melicope* Forst. apparently overlooking the significant feature of the winged seeds. While the floral characters approximate those of *Melicope* Forster, it impresses us as illogical to place a group of rutaceous plants with winged seeds in a genus where the seeds are not at all winged. Lauterbach, Bot. Jahrb. **55:** 246. 1918, accepted Engler's disposition of *Tetractomia* Hook. f.; although, after describing *Terminthodia Schultzei Leonhardi,* he commented, "Die Gattung steht der Sektion *Tetractoma* (Hook. f.) Engl. von *Melicope* ausserordentlich nahe und unterschiedet sich von derselben nur durch die geflügelten Samen." But even if no authentic fruiting material was available for examination, it is to be noted that both the description and the plate of *Tetractomia Roxburghii* Hook. f. Ic. **16:** *t. 1512.* 1886, clearly delineate the character of the winged seeds. Ridley, on the other hand, allied the genus *Terminthodia* to *Evodia,* also because of the number of stamens (4 perfect, none imperfect); the differential character was the winged seed of the former. When describing *Terminthodia oppositifolia,* from New Guinea, however, he enlarged the concept of his genus to include a plant with flowers having "4 staminodes alternating with the stamens each consisting of a short filament adnate to the petal and an abortive triangular anther." By this modified interpretation of the genus it then corresponded to the characters of the much older *Tetractomia* Hook. f.; hence, at least as to the Papuan species, the genus *Terminthodia* Ridley is not tenable. We have seen no material representing the Malay Peninsula *Terminthodia viridiflora* Ridl. which typifies the genus as Ridley originally characterized it.

Tetractomia oppositifolia (Ridl.) comb. nov.
Terminthodia oppositifolia Ridl. Trans. Linn. Soc. Bot. II. **9:** 24. 1916.

Tetractomia rotundifolia (Ridl.) comb. nov.
Terminthodia rotundifolia Ridl. in Gibbs, Contr. Phytog. Fl. Arfak Mts. 143. 1917.

Tetractomia Schultzei Leonhardi (Lauterb.) comb. nov.
Terminthodia Schultzei Leonhardi Lauterb. Bot. Jahrb. **55:** 245. 1918.

Tetractomia Treubiana (Lauterb.) comb. nov.
Terminthodia Treubiana Lauterb. Nov. Guin. **14:** 142. 1924.

Tetractomia orbiculata (Markgraf) comb. nov.
Terminthodia orbiculata Markgraf, Nov. Guin. **14:** 143. 1924.

Tetractomia lanceolata (Lauterb.) comb. nov.
Terminthodia lanceolata Lauterb. Bot. Jahrb. **59:** 535. 1925.

Tetractomia Lauterbachiana nom. nov.

Terminthodia obovata Lauterb. Bot. Jahrb. **55**: 246. 1918.

Netherlands New Guinea: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11197*, January 1939, alt. 1780 m., frequent in primary forest (tree 25 m. high, 45 cm. diameter; bark gray-brown, fairly rough; wood light yellow; flowers rose; fruit greenish brown); *Brass 12016, 12134, 12172*, January 1939, alt. 1800 m. and 1950 m., subsidiary tree in mossy forest.

The specific epithet *obovata* is already pre-empted in the genus *Tetractomia*.

Tetractomia Lauterbachiana forma **pumila** forma nova.

A typo recedit foliis minoribus (3–5 cm. longis, 2–2.5 cm. latis), petiolis circiter 8 mm. longis, floribus paucioribus.

Netherlands New Guinea: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12454* (type), *12192*, February and January 1939, alt. 2150 and 2100 m., mossy forest, common in open parts of the forest and abundant in low scrub on an exposed summit (tree 2–4 m. high; leaves concave with recurved margins; flowers red).

The general habit of these collections is so like that of *Tetractomia Lauterbachiana* that we take them to be a form of the species occurring in exposed places at high altitudes. The leaflets are much smaller with shorter petioles and there are fewer flowers in the inflorescence.

In addition to the above species which we are reasonably sure (from their descriptions) belong to *Tetractomia* Hook. f., Lauterbach, Nov. Guin. **14**: 142. 1924, has suggested another, *Melicope* (*Tetractoma*) *Lamii* Lauterb., based on a flowering specimen. We merely point out that the superficial generic characters of the flowers are so alike that it is practically necessary to know the position of a young seed in the locule, to determine whether the species belongs to *Melicope* Forst. or to *Tetractomia* Hook. f. Those of the former genus show axile placentation, those of the latter are basally located.

Acronychia Forst.

Acronychia rhytidocarpa sp. nov.

Arbor 4–5 m. alta; ramulis glabratis, innovationibus velutino-tomentosis; foliis trifoliolatis; petiolo 4–9.5 cm. longo, tomentoso ad glabrato; foliolis petiolulatis (petiolulis ± 7 mm. longis, minute pubescentibus), chartaceis, pellucido-punctatis, oblongo-ellipticis, basi acutis vel cuneatis, in petiolulum decurrentibus, apice breviter atque obtusissime

acuminatis, utrinque glabris, interdum costa pubescentibus; venis primariis utrinsecus 11–16, patenti-adscendentibus, marginem versus curvatis, inconspicue anastomosantibus; venulis laxe reticulatis, inconspicuis; inflorescentiis axillaribus praecipue in axillis foliorum delapsorum, 4–6 cm. longis; axi, ramulis pedicellisque minute denseque tomentosis; pedicellis fructiferis 4 mm. longis; floribus non visis; calyce breviter lobato, pubescente; petalis extus minute pubescentibus, intus ad basim pubescentibus; staminibus intus ad basim ?pilosis; fructibus apertis circiter 1.5 cm. diametro; exocarpio glanduloso, extus dense transverse rugoso.

BRITISH NEW GUINEA: Central Division, Laloki River, Rona, *Brass 3566* (TYPE), March 1933, alt. 450 m., gully rain-forests, common (small tree 4–5 m. tall, with rather rough brown bark, and pale somewhat fleshy leaves; fruit rugose, yellow green, very glandular and secreting in the rind a yellowish viscid substance with a pungent odor).

This collection has previously been associated with *Acronychia melicopoides* F. v. Muell. Although the foliage is somewhat like that of the species mentioned, the fruits of the two are unlike. That of the Australian plant has a thicker pericarp and lacks the copious glandular secretion which is an outstanding feature of the fruit of the Papuan species.

Acronychia elliptica sp. nov.

Arbor usque 15 m. alta; ramulis subteretibus, innovationibus minute pubescentibus, mox glabratis; foliis unifoliolatis; petiolo 1.5–4 cm. longo, puberulo, mox glabro; foliolo sessili, chartaceo, elliptico, 9–14 cm. longo, 4–7 cm. lato, basi cuneato, apice obtuso vel retuso, utrinque glabro, subtus minute atro-punctato; venis primariis utrinsecus ± 14, oblique patentibus, marginem versus arcuatim anastomosantibus; venulis numerosis, reticulatis, utrinque manifestis; paniculis axillaribus, 3–4.5 cm. longis; axi, ramulis pedicellisque puberulis; sepalis rotundatis, vix 1 mm. longis, puberulis; petalis 5 mm. longis, 1–1.5 mm. latis, glabris, ad basim ciliatis; staminibus 8, filamentis subulatis, basim versus dilatatis, fere ad medium dense hirsutis (pilis retrorsis), basi intus glabris; antheris ellipticis, 0.5 mm. longis; disco 0.5 mm. alto, glabro; ovario circiter 2 mm. longo, villoso; stylo 2 mm. longo, basi tantum parce villoso; stigmate vix incrassato, 4-lobulato.

BRITISH NEW GUINEA: Western Division, Daru Island, *Brass 6309* (TYPE), March 1936, common in light rain-forest (tree about 15 m. high; bark brown, slightly fissured; flowers white; fruit not seen); Upper Wassi Kussa River (left branch), *Brass 8643,* January 1937, gallery

rain-forests (common small tree 3–4 m. high; leaf-nerves pale and conspicuous above; flowers green).

The plant superficially resembles *Acronychia laevis* Forst., but it is readily distinguished from the latter by the villous ovary. In the latter character it is like the Malaysian *A. pedunculata* (L.) Miq., yet differs in the glabrous petals and disk; the inflorescence is also much shorter.

Acronychia goniocarpa sp. nov.

Arbor magna, 25 m. alta, cauli 25–40 cm. diametro; ramulis glabris, in sicco nigrescentibus, innovationibus puberulis; foliis uni- atque trifoliolatis; petiolo 3–6 cm. longo, glabro vel puberulo; foliolis petiolulatis (petiolulis 1–1.5 cm. longis), subcoriaceis, minute glanduloso-punctulatis, oblongo-ellipticis, 10–20 cm. longis, 4.5–7 cm. latis, basi subrotundato-cuneatis (lateralibus basi inaequalibus), brevissime obtuseque acuminatis vel obtusis, utrinque glaberrimis; venis primariis utrinsecus 14–18, patenti-curvatis, marginem versus arcuatim anastomosantibus, in utraque pagina subaequaliter manifestis; venulis numerosis, reticulatis, manifestis; inflorescentiis axillaribus, saepissime ex axillis foliorum delapsorum, ± 9 cm. longis pedunculo 3–4 cm. longo incluso, glabris; floribus non visis; sepalis 1 mm. longis, 2 mm. latis, ad medium connatis; disco annulari, glabro; filamentis glabris; fructibus glabris, minute glandulosis, 1.3–1.5 mm. longis, angulatis, obpyriformibus, apiculatis (stylo basi subhirtello), pericarpio in sicco irregulariter lacunoso-fissurato.

Netherlands New Guinea: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11926, Brass 12093* (type), January 1939, alt. 1780 m. and 1750 m., rain-forest of upper slopes (large canopy tree 25 m. high, 25 cm. stem-diameter [other collection 41 cm.], branchlets, petioles, and peduncles covered with a pale glaucous bloom; fruit yellow, deeply rugose).

The fruit of *Acronychia goniocarpa* somewhat resembles that of *A. acidula* F. v. Muell. but the epicarp is irregularly torn in drying. The latter species has only unifoliolate leaves.

Acronychia melicopoides F. v. Muell. Fragm. Phytogr. Austr. **5:** 3. 1865; F. M. Bail. Queensl. Fl. **1:** 209. 1899; Lauterb. Bot. Jahrb. **55:** 251. 1918, Nov. Guin. **14:** 144. 1924; C. T. White Contr. Arnold Arb. **4:** 50. 1933.

Netherlands New Guinea: Hollandia, *Brass 8955,* July 1938, alt. 20 m., rare in dry open rain-forest second growth (tree 3 m. high).

This species has already been reported by Lauterbach from Humboldt Bay. We merely add that the material cited above agrees precisely

with the Australian collections in both flower and fruit characters. The leaves of the New Guinea specimens are smaller and somewhat more glandular, the obtusely acuminate apex is distinctly recurved, and the base is acutely cuneate, usually a little narrower than in the Australian specimens.

Acronychia Pullei Lauterb. Bot. Jahrb. **55:** 250, 251. 1918, Nov. Guin. **14:** 144. 1924.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11951, Brass 12044,* January 1939, alt. 1900 m. and 1800 m., in mossy forest on slopes (tree 6–25 m. high; fruit yellow, rugose). NORTHEASTERN NEW GUINEA: Busu River, *Clemens 6274,* May 1937, alt. 1800–2400 m. BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass 4883,* May–September 1933, alt. 2400 m., in forest regrowths (small tree with pale dull leaves and numerous white flowers).

The dried fruit is small, 5–6 mm. diameter, subglobose, flattened at the base, copiously dotted with minute glands, and roughened by irregular short clefts in the apparently fleshy pericarp. The species was described from a flowering specimen.

Acronychia trifoliolata Zoll. & Mor. in Zoll. Nat. Geneesk. Arch. Neerl. Ind. **2:** 585. 1845; Koord. & Val. Meded. Lands Plant. **17:** 236 (Bijdr. Boomsoort. Java **4:** 326). 1896 (as *trifoliata*).

SOLOMON ISLANDS: Guadalcanal, Sorvorhio Basin, *Kajewski 2699,* January 1932, alt. about 270 m., common in rain-forest (tree ± 22 m. high, with light gray bark, cream-colored flowers, and small yellow-green fruits citron-scented when crushed, 7 mm. long, 5 mm. diameter).

The collection compares favorably with the material from Java assigned to this species.

Acronychia Muelleri (Engler) W. D. Francis, Kew Bull. **1931:** 190. 1931 and *A. cauliflora* Lauterb. ought to be compared. We suspect that the latter species, Bot. Jahrb. **55:** 253, *f. 5.* 1918, is identical with the former which holds the right of priority in name. We do not care to make the reduction without the opportunity of examining the types.

Acronychia anomala Lauterb. Nov. Guin. **14:** 145. 1924, cannot possibly be an *Acronychia* according to the accepted generic concept. We have no specimen which fits the description, so we leave its proper disposition to others. It may prove to be an *Evodia.*

Flindersia R. Br.

Flindersia Schottiana F. v. Muell. Fragm. Phytogr. Austr. **3:** 25. 1862; F. M. Bail. Queensl. Fl. **1:** 241. 1899; Maiden, For. Fl. N. S. W.

2: 155. *t. 69, 70.* 1905; C. T. White, Proc. Linn. Soc. N. S. W. **46:** 327. 1921.

British New Guinea: Lower Fly River, east bank opposite Sturt Island, *Brass 7991,* October 1936, rain-forest, common on ridges (large canopy tree; stem spur-buttressed; bark pale brown-gray, with prominent corky lenticels; wood soft, white; leaves pale below; flowers white, sweet-scented). Previously known from Australia.

Flindersia chrysantha sp. nov.

Arbor ± 23 m. alta; ramulis fuscis, lenticellatis, novellis puberulis; foliis oppositis vel suboppositis, pari- ac impari-pinnatis, 2–3-jugis; petiolo 3–4.5 cm. longo et rhachi 2.5–4.5 cm. longa glabratis; foliolis oppositis vel suboppositis, coriaceis, 6–10 cm. longis, 2–3.5 cm. latis, late lanceolatis vel falcato-oblongis, inaequilateralibus (vel terminali subaequilaterali), basi ± rotundatis, apice acuminatis (acumine ± 1 cm. longo), petiolulatis (petiolulis ± 6 mm. longis), utrinque glabris, margine integris; costa subtus prominente; venis primariis utrinsecus 10–13, manifestis; paniculis amplis; axi, ramulis pedicellisque dense puberulis vel brevissime pubescentibus; floribus flavis; sepalis 1 mm. longis, ovatis, obtusis, glabratis, ciliolatis; petalis ellipticis, 3 mm. longis, obtusis, glabris; filamentis 2 mm. longis, prope apicem parce pilosis, antheris ovoideis cordatis, apiculatis; staminodiis longitudinem filamentorum fere aequantibus, applanatis; disco membranaceo, undulato, glabro; ovario dense pubescente, 5-loculari, stylo brevissimo (0.4 mm. longo), stigmate depresse capitato-lobato.

Netherlands New Guinea: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh 11128* (type), November 1938, alt. ± 2300 m., frequent tree of old secondary forest (23 m. high, 30 cm. diameter; bark 5 mm. thick, brown, smooth; flowers yellow).

Flindersia chrysantha belongs in the same sequence with *F. laevicarpa* C. T. White, *F. Pimenteliana* F. v. Muell. and *F. Oxleyana* F. v. Muell. It seems most like the first, but the specimens are not in comparable stages of development (one flowering, one fruiting). In *F. laevicarpa* C. T. White the leaves are decurrent at the base (in *F. Oxleyana* they are narrowed at the base), and the branches of the panicle are glabrous or very thinly puberulent. The flowers of *F. Pimenteliana* F. v. Muell. are red, and the petals are pubescent outside.

Arnold Arboretum,
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STUDIES OF PAPUASIAN PLANTS, I*

A. C. SMITH

A SERIES of papers, of which this is the first, is planned to discuss certain groups of plants represented by the accumulated material in the herbarium of the Arnold Arboretum from New Guinea and the Solomon Islands. The larger part of the New Guinea specimens has been obtained by Mr. L. J. Brass, botanist of the Richard Archbold Expeditions, while the material from the Solomon Islands was chiefly collected by Mr. Brass and Mr. S. F. Kajewski. This series is expected to be supplementary to that of Drs. E. D. Merrill and L. M. Perry, Plantae Papuanae Archboldianae, now appearing in the Journal of the Arnold Arboretum.

All specimens cited in this series, unless otherwise mentioned, are deposited in the herbarium of the Arnold Arboretum.

MYRISTICACEAE

Since Dr. F. Markgraf (Bot. Jahrb. **67**: 143–170. 1935) has recently and ably summarized the Papuan species of Myristicaceae, no attempt is here made to discuss all of the recently collected specimens or to revise the group. The present treatment is limited merely to a discussion of range-extensions or specimens of unusual interest and to descriptions of 16 species which appear to be new. The order of treatment essentially follows that adopted by Markgraf. For the purposes of this study I have examined specimens deposited in the following herbaria: Arnold Arboretum (A), New York Botanical Garden (NY), U. S. National Herbarium (US), and Yale School of Forestry (Y); I am indebted to the Directors and Curators of these institutions for the privilege of borrowing material. The place of deposit of specimens is shown by the indicated letters in parentheses; when no place of deposit is shown, the specimen has been seen only in the herbarium of the Arnold Arboretum.

HORSFIELDIA Willd.

Horsfieldia trifida sp. nov.

Arbor ad 26 m. alta ubique praeter inflorescentiam et ramulos novellos inconspicue ferrugineo-puberulos glabra, cortice crassa nigrescente,

*Botanical Results of the Richard Archbold Expeditions.

trunco ad 60 cm. diametro, ramulis subteretibus; petiolis gracilibus leviter canaliculatis 11–17 mm. longis; laminis papyraceis vel chartaceis anguste oblongis, 22–28 cm. longis, 5.5–7 cm. latis, basi plerumque rotundatis interdum obtusis, apice cuspidatis vel breviter acuminatis (apice ipso obtuso ad 4 mm. longo), margine leviter reflexis, costa supra subplana vel leviter elevata subtus prominente, nervis secundariis utrinsecus 17–22 patentibus leviter arcuatis marginem versus manifeste anastomosantibus supra subplanis subtus valde prominulis, venulis laxe reticulatis utrinque immersis vel subtus prominulis; inflorescentiis ♂ laxiuscule paniculatis 7–11 cm. longis et latis, pedunculo brevi (ad 5 mm. longo) 1.5–2 mm. diametro, ramulis paucis patentibus, floribus 5–8 in fasciculos aggregatis, bracteis minutis mox deciduis; pedicellis ad 2 mm. longis cum basi perianthii arcte ferrugineo-tomentellis (pilis minutis ramosis demum caducis); perianthio obovoideo sub anthesi 1.5–2 mm. longo fere ad basim plerumque tripartito, lobis 3 (raro 4) deltoideis subacutis; filamentis in columnam clavatam 0.2–0.5 mm. longam connatis, antheris plerumque 14, 0.5–0.6 mm. longis, columnae dorso adnatis fere ad apices connatis; inflorescentiis ♀ et fructibus desideratis.

Netherlands New Guinea: Bernhard Camp, Idenburg River, *Brass & Versteegh 14017* (type), April 25, 1939, alt. 75 m., in rainforest on lower mountain slope (rare tree with red-brown wood and a small amount of red latex). Northeastern New Guinea: Minjem-Gebiet, Kani-Gebirges, *Schlechter 17171* (A, NY), alt. 800 m.

This is doubtless the species which Markgraf (Bot. Jahrb. **67**: 148. 1935) referred to *H. oblongata* Merr., a Philippine species which probably does not occur in New Guinea. Compared with the new species, *H. oblongata* has the leaf-blades smaller (11–20 cm. long), somewhat elliptic and with the margins distinctly not parallel, the leaf-base acute or subacute but never rounded, the secondaries fewer (9–11), and the anastomoses fainter and farther from the margins. *Schlechter 17171* was cited by Markgraf, but I have not seen the other specimens mentioned by him, nor those which Pulle (Nova Guinea Bot. **8**: 636. 1912) referred to *H. costulata* (Miq.) Warb. and *H. leptocarpa* Warb. Possibly all of these specimens represent *H. trifida*, the closest relative of which appears to be (as indicated by Markgraf) *H. sepikensis* Markgraf. *Horsfieldia trifida* differs from this in its larger leaf-blades, rounded leaf-base, numerous secondaries, more ample ♂ inflorescence, short pedicels, and obvious androecium-stalk.

Horsfieldia Hellwigii (Warb.) Warb. Nova Acta Acad. Leop.-Carol. **68**: 343. 1897; Warb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee 325. 1901; Markgraf, Bot. Jahrb. **67**: 150. 1935.

NORTHEASTERN NEW GUINEA: Morobe District, Wareo, *Clemens 1838*, alt. about 550 m.

This species has previously been known from three specimens from the same general region as the above. Although I have seen none of these, the Clemens specimen seems to match Warburg's description in vegetative details and to key to the species according to Markgraf. The leaf-blades of the present specimen are up to 11.5 cm. broad, somewhat broader than those previously described. As the Clemens specimen bears the first staminate inflorescence known for the species, this is described below. The pistillate inflorescence is notably shorter, according to Warburg, but this condition is to be expected in the group and does not necessarily indicate that a different species is represented. However, the Clemens specimen should be checked against the type before it is definitely taken to represent the species.

Staminate inflorescences densely brown-tomentose on all exterior surfaces (except flowers) with irregularly and copiously branched hairs, loosely paniculate, up to 10 cm. long and 6 cm. broad, the peduncle short (up to 1 cm. long), stout (about 3 mm. in diameter), the branches spreading; flowers in loose fascicles of 2–4, the bracts minute, evanescent, the pedicels slender, 2–4 mm. long; perianth subglobose, about 3 mm. in diameter, 2-lobed nearly to base; androecium-stalk stout, very short, the anthers about 14, about 1.5 mm. long, laterally connate to apex.

Horsfieldia tuberculata (K. Schum.) Warb. Nova Acta Acad. Leop.-Carol. **68**: 279, *pl. 23*. 1897; Markgraf, Bot. Jahrb. **67**: 151. 1935.

SOLOMON ISLANDS: Bougainville: Siwai, *Waterhouse 178* (A, Y) (jungle tree; common names: *Kagkag, Aiqil, Tutupun*). Teop, northeast of Bougainville: *Waterhouse 35* (Y) (small tree about 6 m. high, the trunk about 12 cm. diam.; common name: *Vadovodovuru*).

Although the cited specimens have flowers slightly larger than usual for the species, they appear to fall into a reasonable concept of it. *Horsfieldia tuberculata* has not previously been reported east of New Ireland (Neu Mecklenburg).

Horsfieldia novo-guineensis Warb. Nova Acta Acad. Leop.-Carol. **68**: 271. 1897; Warb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee 323. 1901; Pulle, Nova Guinea Bot. **8**: 635. 1912; Markgraf, Bot. Jahrb. **67**: 151. 1935.

SOLOMON ISLANDS: Bougainville: Koniguru, *Kajewski 2022*, alt. 850 m. (common name: *Kisu-kisu*). Ysabel: Sigana, *Brass 3460*. Guadalcanal: Berande, *Kajewski 2444* (common name: *Ni-niu*); Ululolo, Tutuve Mt., *Kajewski 2554*, alt. 1200 m.; Sorvorhio

basin, *Kajewski 2710,* alt. 200 m. (common name: *Korvai*). San Cristoval: Huro R., *Brass 2605* (common name: *Do-do*). Both collectors mention the tree as common in rain-forest.

Although this species has been reported from many collections in New Guinea, these are apparently the first from the Solomon Islands.

Horsfieldia solomonensis sp. nov.

Arbor 10–20 m. alta ubique praeter inflorescentiae ramulos interdum arcte ferrugineo-tomentellos et partes novellas saepe puberulas glabra, cortice brunnea rimosa; ramulis subteretibus vel apicem versus leviter complanatis; petiolis anguste alatis 8–17 mm. longis circiter 2 mm. diametro; laminis papyraceis vel chartaceis siccitate umbrinis amplis elliptico-oblongis plerumque manifeste obovatis, 20–32 cm. longis, (5–) 7–15 cm. latis, basi obtusis vel subrotundatis et in petiolum decurrentibus, apice abrupte cuspidatis, margine planis vel leviter reflexis, costa lata supra subplana subtus prominente, nervis secundariis utrinsecus 13–18 patentibus marginem versus leviter arcuatis et inconspicue anastomosantibus supra subplanis vel leviter impressis subtus prominulis, venulis inconspicue et laxe reticulatis utrinque subplanis vel leviter prominulis; inflorescentiis ♂ multifloris laxe paniculatis, 6–13 cm. longis, 3–6 cm. latis, pedunculo ad 1 cm. longo et rhachi saepe flexuosa 1.5–2 mm. diametro, ramulis patentibus, floribus 4–10 in fasciculos apices ramulorum versus laxe aggregatis, bracteis mox caducis; pedicellis robustis 1.5–3 mm. longis; perianthio subgloboso vel transverse ellipsoideo valde complanato sub anthesi circiter 2 mm. longo et 2–3 mm. lato fere ad basim bilobato, lobis rotundatis; filamentis in columnam crassam sed brevissimam et inconspicuam connatis, antheris 15–21, circiter 1.5 mm. longis, columnae crassae dorso adnatis, ad apices connatis; inflorescentiis ♀ brevioribus (ad 5 cm. longis et 4 cm. latis), minus ramosis; floribus 2 vel 3 in fasciculos laxos aggregatis, pedicellis crassis ad 2 mm. longis; perianthio crasso obovoideo, 3–4 mm. longo, 2–3 mm. lato, profunde bilobato; ovario obovoideo, stigmate conspicue sulcato; fructibus maturitate ellipsoideis leviter verrucosis bicostatis ad 25 mm. longis et 15 mm. latis (ad 35 × 23 mm. ex Brass), pericarpio tenui siccitate 0.5–1 mm. crasso, arillo sicco fulvo, semine ellipsoideo, testa levi siccitate cinerea.

Solomon Islands: Bougainville: Kieta, *Kajewski 1549* (type), March 18, 1930 (tall tree to 20 m. high). Guadalcanal: Berande, *Kajewski 2440* (medium-sized tree to 10 m. high; common name: *Tarle;* bark macerated in water and the solution drunk to check haemorrhages). Ulawa: *Brass 2983* (excurrent tree 15 m. high, the

bark brown, fissured; flowers yellow; fruits to 3.5 cm. long and 2.3 cm. broad, obscurely 4-angled; common name: *Totonio*). The tree is said to be common in rain-forest at low altitudes. Pistillate inflorescences and fruits are described from *Brass 2983*, the other specimens bearing staminate inflorescences.

Horsfieldia solomonensis is characterized by its large thin leaf-blades with the greatest breadth usually above the middle. Its closest relative is probably *H. novo-guineensis* Warb., with narrower leaf-blades, somewhat less congested staminate flowers, fewer anthers, and smaller fruits.

Horsfieldia pachycarpa sp. nov.

Arbor compacta ad 10 m. alta ubique sub fructu glabra, ramulis crassis (apices versus 3.5–5 mm. diametro) fuscis leviter biangulatis parce lenticellatis; petiolis crassis (2.5–3 mm. diametro) conspicue canaliculatis 4–6 mm. longis; laminis subcoriaceis vel chartaceis elliptico-obovatis, 17–21 cm. longis, 6–7.5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice cuspidatis vel subito caudato-acuminatis (acumine 1–1.5 cm. longo acuto), margine undulatis et siccitate anguste revolutis, utrinque leviter rugulosis in sicco fuscis et saepe subtus paullo pallidioribus, costa conspicua supra subplana subtus prominente, nervis secundariis utrinsecus 11–14 arcuato-adscendentibus inconspicue anastomosantibus supra leviter impressis subtus valde prominulis, venulis immersis obscuris; fructibus ut videtur solitariis e ramulis infra folia orientibus, pedicellatis (pedicellis ad 2.5 mm. diametro et 15 mm. longis), inaequaliter subgloboso-ellipsoideis, 3.5–4 cm. longis, 3–3.7 cm. latis, longitudinaliter indistincte carinatis, pericarpio 6–14 mm. crasso extus sublevi et remote verrucoso, arillo integro, semine oblongo-ellipsoideo 22–24 mm. longo 13–15 mm. lato, testa tenui levi.

BRITISH NEW GUINEA: Biriatabu, *Brass 610* (TYPE), alt. 450 m., Nov. 11, 1925 (compact tree 10 m. high in rain-forest, the bark channelled, scaly, light brown; fruit compressed, brown).

Horsfieldia pachycarpa is well characterized by its very short stout petioles, obovate few-nerved leaf-blades, and especially by its large thick-walled fruits. In foliage it suggests both *H. tuberculata* (K. Schum.) Warb. and *H. olivaeformis* Warb., but obviously differs from both in the above-mentioned characters. The type of the new species was mentioned by Markgraf (in White, Jour. Arnold Arb. **10**: 214. 1929) as *Myristica* sp.

Horsfieldia congestiflora sp. nov.

Arbor ad 15 m. vel plus alta ubique praeter inflorescentiam et partes novellas demum glabra; ramulis gracilibus subteretibus juventute arcte

ferrugineo-tomentellis; petiolis anguste alatis 8–15 mm. longis ut ramulis tomentellis; laminis chartaceis siccitate fuscis anguste elliptico-oblongis, 20–25 cm. longis, 5–8 cm. latis, basi obtusis vel subrotundatis, apice plerumque longe acuminatis interdum conspicue cuspidatis, margine subplanis, utrinque minute verrucosis vel interdum sublevibus, costa supra subplana vel leviter elevata subtus prominente, nervis secundariis utrinsecus 16–18 patentibus marginem versus inconspicue anastomosantibus supra subplanis vel inconspicue elevatis subtus prominulis, venulis laxe reticulatis supra obscuris subtus leviter prominulis; inflorescentiis ♂ amplis multifloris laxe paniculatis 3–5-plo ramosis, ad 15 cm. longis et 8 cm. latis, pedunculo gracili ut videtur ad 4 cm. longo et rhachi saepe flexuosa ramulisque conspicue ferrugineo-tomentellis (pilis copiose ramosis) demum subglabris; floribus 8–15 in fasciculos dense confertos apices ramulorum versus aggregatis, bracteis deltoideo-oblongis puberulis ad 2 mm. longis mox caducis; pedicellis gracillimis 0.5–1 mm. longis mox glabris; perianthio glabro subgloboso tenui sub anthesi 1–1.3 mm. diametro profunde bilobato, conspicue nigro-glanduloso; androecio obovoideo 0.7–1 mm. longo, stipite quam antheris paullo breviore basi angustato, antheris 7 vel 8 apice liberis et conspicue incurvatis; inflorescentiis fructiferis crassis ad 10 cm. longis, fructibus paucis maturitate aurantiacis anguste elliptico-ovoideis, 4–5 cm. longis, 1.5–2.5 cm. latis, bicostatis, basi et apice subacutis, pericarpio basim versus ad 3 mm. distaliter circiter 1 mm. crasso extus plerumque verrucoso, arillo carnoso rubro (ex Brass), semine anguste ovoideo, testa siccitate leviter sulcata cinerea.

British New Guinea: Western Division, Lower Fly River, east bank opposite Sturt Island, *Brass 8010* (type), October 1936, common in rain-forest on river flood-plains (stem prominently flanged at base; bark reddish, very thick and hard, with pitted flaky surface; flowers yellow, fragrant); Palmer River, 2 m. below junction of Black River, *Brass 6969*, common in forest substage on river banks (branches drooping, leafy toward apices; fruiting inflorescences lateral on old wood). Staminate inflorescences are described from the type and fruits from *Brass 6969*.

Horsfieldia congestiflora is well-marked by its minute and densely crowded staminate flowers on ample inflorescences which are tomentellous, at least until anthesis. These characters readily distinguish it from other Papuan species. Its closest relative is apparently *H. pilifera* Markgraf, from which the new species differs in the above mentioned characters, its proportionately somewhat narrower leaf-blades with more obviously elongate apices and more numerous secondaries, its glandular

perianth, and its androecium with an obvious stalk and fewer anthers, which are inflexed at the apices.

MYRISTICA L.

Myristica Markgraviana sp. nov.

Arbor, ramulis gracilibus juvenilibus leviter angulatis arcte et densissime ferrugineo-tomentellis demum teretibus cinereis glabris; petiolis supra complanatis 15–25 mm. longis ut ramulis juventute tomentellis mox glabris; laminis chartaceis fuscescentibus oblongo-ellipticis, 12–17 cm. longis, 5–8 cm. latis, basi obtusis vel subacutis, apice ut videtur cuspidatis vel breviter acuminatis, supra saepe nitidis praeter costam interdum tomentellam glabris, subtus pallidioribus et (praecipue ad nervos) parce brunneo-tomentellis demum glabris, costa valida supra subplana subtus prominente, nervis secundariis utrinsecus 12–15 patentibus rectis margines versus arcuatis et inconspicue anastomosantibus supra impressis subtus valde prominulis, venulis obscuris interdum supra leviter impressis et subtus inconspicue prominulis; inflorescentiis ♂ axillaribus paucifloris 3–6 cm. longis pauciramosis ubique densissime ferrugineo-velutinis (pilis saepe ad 1.5 mm. longis infra medium dense et breviter plumosis), pedunculo brevi vel subnullo et rhachi 2–3 mm. diametro; floribus 2–5 in fasciculos ad apices inflorescentiae ramulorum aggregatis vel interdum apices versus solitariis, bracteis parvis, pedicellis validis sub anthesi 6–13 mm. longis apice bracteola carnosa late suborbiculari-ovata rotundata circiter 2–3 mm. longa et 3–5 mm. lata intus glabra bracteolatis; perianthio crasse carnoso ellipsoideo vel obovoideo, sub anthesi 6–10 mm. longo et 5–7 mm. diametro, intus glabro, lobis 3 oblongo-deltoideis subacutis 2–4 mm. longis; androecio quam perianthio paullo breviore, stipite 1–2 mm. longo crasso (0.6–0.8 mm. diametro) striato, antheris 16 vel 17, 4–7 mm. longis, ad columnam crassam subtrigonam adnatis.

NORTHEASTERN NEW GUINEA: Morobe District, Quembung, *Clemens 1142* (TYPE), alt. 650–900 m., December 11, 1935; Minjem region, Kaulo, near Stephansort, *Schlechter 16789* (A, NY), alt. 300 m.

The Schlechter specimen was cited by Markgraf (Bot. Jahrb. 67: 158. 1935) as *M. philippensis* Lam., which probably does not occur in New Guinea and which differs from *M. Markgraviana* in its more numerous staminate flowers with shorter pedicels, much larger bracteoles, and closer and paler tomentum. The leaf-blades of the Philippine species average considerably longer than those of the new species and have more numerous secondaries. Among Papuan species, *M. Markgraviana* is perhaps closest to *M. velutina* Markgraf and *M. cucullata* Markgraf, but

the type of inflorescence, the broadly ellipsoid perianth, the pubescence, and leaf-characters readily distinguish it.

Myristica fusca Markgraf, Bot. Jahrb. **67:** 158. 1935.

Netherlands New Guinea: Bernhard Camp and vicinity, Idenburg River, *Brass & Versteegh 13185,* alt. 800 m., frequent in rain-forest on slopes (tree 22 m. high, the trunk 50 cm. diam., the crown not wide-spreading, the bark 15 mm. thick, black, scaly, exuding a red sap, the wood red-brown); *Brass & Versteegh 13545,* alt. 100 m., frequent in rain-forest on lower mountain slopes (tree 29 m. high, the trunk 40 cm. diam., the crown, bark, and wood as above, the flowers yellow).

This well-marked species has been reported only from the three collections mentioned by Markgraf from Northeastern New Guinea. The following description of the fruit, previously apparently unknown, is taken from *Brass & Versteegh 13185*:

Fruiting pedicels terete, stout (5–6 mm. diam.), about 1 cm. long; fruits narrowly ellipsoid, 4.5–6 cm. long, 2–3 cm. diam., persistently and densely brown-tomentellous, obtuse at base, subacute or bluntly mucronate at apex, the pericarp about 1.5 mm. thick, the aril deeply laciniate, the seed oblong-ellipsoid, up to 3.5 cm. long and 1.8 cm. diam., dark brown when dried.

Myristica Hollrungii Warb. Nova Acta Acad. Leop.-Carol. **68:** 490. 1897; Warb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee 328. 1901; Markgraf, Jour. Arnold Arb. **10:** 213. 1929; Markgraf, Bot. Jahrb. **67:** 159. 1935.

British New Guinea: Western Division, Wuroi, Oriomo River, *Brass 5765* (A, NY), *5766* (A, NY) (the principal tree on low river-banks frequently covered by tidal backwater; erect tree 15–20 m. tall, the bark dark gray and rough, the lower trunk frequently producing clumps of long stout down-turned adventitious roots, the branchlets and leaf-nerves yellowish, the leaf-blades smooth, glaucous beneath; fruit yellow-green, to 4.5 cm. long and 3.3 cm. broad, the aril red); east bank of lower Fly River, opposite Sturt Island, *Brass 8008* (the characteristic tree of a specialized type of tall forest restricted to low flood-plains frequently inundated by high tides, attaining a height of over 30 m. and a girth of 2 m., the trunk long and straight, supporting a spreading crown on rather weak branches, and with a great development of *Rhizophora*-like flying-buttress roots at base; leaves glaucous beneath; fruit yellow, ovate, about 4 cm. long, the aril red; vernacular name: nutmeg mangrove).

Although several specimens of this species have been mentioned by Markgraf, the above records are listed because, to the best of my knowledge, the peculiar habit and habitat have not otherwise been detailed.

Myristica Kajewskii sp. nov.

Arbor ad 20 m. alta ubique praeter fructus et probabiliter inflorescentiam glabra, ramulis robustis (apices versus 3–6 mm. diametro) subteretibus saepe striatis fuscis vel nigrescentibus; petiolis crassis (3–4 mm. diametro) supra canaliculatis 2.5–4 cm. longis; laminis subcoriaceis siccitate fusco-olivaceis elliptico-oblongis, 20–33 cm. longis, 7–13 cm. latis, basi rotundatis vel subobtusis et in petiolum breviter decurrentibus, apice subacutis vel obtusis, margine anguste recurvatis, supra saepe nitidis, subtus pallidioribus et canescentibus, costa valida supra leviter elevata subtus valde prominente, nervis secundariis utrinsecus 17–25 patentibus margines versus arcuatis et anastomosantibus supra subplanis vel leviter impressis subtus valde prominulis, venulis immersis vel interdum supra obscure impressis; fructibus axillaribus ut videtur solitariis, pedunculo crassissimo (9–12 mm. diametro) 1.5–2 cm. longo plus minusve verrucoso saepe obscure ferrugineo-tomentello; fructibus ovoideo-ellipsoideis, maturitate 5–7 cm. longis et 4–5.5 cm. latis (ad 8.5 × 7.5 cm. ex Kajewski), utrinque subrotundatis, apice saepe obscure apiculatis, extus rugosis densissime et arcte ferrugineo-tomentellis, pericarpio lignoso 5–10 mm. crasso, arillo fere a basi in lacinias latas paucas fisso, semine elliptico-oblongo, 30–35 mm. longo, 17–22 mm. lato, arilli impressionibus leviter sed distincte sulcato, testa dura castanea circiter 0.8 mm. crassa.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski 1736,* alt. 1000 m. (large tree to 20 m. high, the leaves silvery beneath); Lake Luralu, Koniguru, Buin, *Kajewski 2068,* alt. 1500 m. (tree to 10 m. high, growing in a region of stunted forest; fruit to 8.5 by 7.5 cm., with a spicy fragrance). Guadalcanal: Uulolo, Tutuve Mt., *Kajewski 2613* (TYPE), alt. 1200 m., May 2, 1931 (large tree to 20 m. high, with fair-sized buttresses; common name: *Hig-hambure;* bark macerated and the liquid drunk to check haemorrhages).

Myristica Kajewskii, which the collector notes as common in rainforest at the listed altitudes, is characterized by its large long-petioled leaves and extremely large thick-walled pubescent fruits. As all the specimens lack flowers, it is difficult to relate the species accurately, but on other characters it suggests *M. Hollrungii* Warb., a lowland Papuan species with shorter petioles and smaller glabrous fruits.

Myristica petiolata sp. nov.

Arbor ubique praeter fructus et certe inflorescentiam (non visam) glabra, ramulis (apices versus 3–5 mm. diametro) subteretibus rugosis siccitate fuscis; petiolis 2.5–6 cm. longis 2–3.5 mm. diametro valde rugosis supra canaliculatis; laminis subcoriaceis fusco-olivaceis ellipticooblongis, 19–23 cm. longis, 5–9 cm. latis, basi rotundatis vel late obtusis et in petiolum decurrentibus, apice cuspidatis vel breviter acuminatis (acumine ipso obtuso), utrinque levibus et concoloribus, costa supra subplana vel acute prominula subtus valde prominente, nervis secundariis utrinsecus 22–25 patentibus rectis margines versus obscure anastomosantibus supra subplanis subtus paullo prominulis, venulis immersis; fructibus solitariis vel 2–4 ad apicem pedunculi crassi (4–5 mm. diametro) ad 1 cm. longi verrucosi aggregatis, pedicellis brevibus crassis arcte tomentellis; fructibus oblongo-ellipsoideis, 3–3.5 cm. longis, 1.7–2 cm. latis, basi rotundatis, apice obtuse apiculatis, densissime et arctissime spadiceo-velutinis (pilis ad 2 mm. longis persistentibus), pericarpio lignoso 1.5–3 mm. crasso, arillo fere a basi in lacinias latas fisso, semine ellipsoideo.

Solomon Islands: Ysabel: Tatamba, *Brass 3434A* (type), in hardwood forests, alt. 50 m., January 5, 1933 (tall slender tree, the bark gray, slightly fissured, the branchlets rusty brown).

As the above-cited collection bears only fruits and leaves, it cannot accurately be placed within the genus, but I feel certain that it represents an undescribed species. It is characterized by its long-petioled leaves and by the remarkably long and thick tomentum of its fruits. A species of somewhat similar aspect is the Papuan *M. subcordata* Bl., with petioles hardly exceeding 1 cm. in length and with paler and less dense fruit-pubescence. The discovery of flowers, however, may prove *M. petiolata* to have other relationships.

Myristica pachyphylla sp. nov.

Arbor ad 22 m. alta praeter inflorescentiam et fructus immaturos breviter pilosos glabra, trunco gracili ad 50 cm. diametro, ramulis gracilibus teretibus interdum leviter flexuosis; petiolis gracilibus (1–2 mm. diametro) 8–15 mm. longis conspicue canaliculatis; laminis tenuiter coriaceis fusco-olivaceis ovato-oblongis, 9–17 cm. longis, 3–7 cm. latis, basi obtusis et in petiolum decurrentibus, apice gradatim et longe attenuatis (acumine gracili 1–2 cm. longo), margine saepe anguste recurvatis, subtus paullo pallidioribus et interdum parce brunneo-punctatis, costa valida supra conspicue elevata subtus prominente, nervis secundariis utrinsecus 12–22 patentibus rectis margines versus anastomosantibus

supra acute impressis subtus prominulis, in intervallis nervis brevioribus tenuioribusque parallelis interdum interjectis, venulis plerumque supra impressis subtus obscuris; inflorescentiis ♂ supraaxillaribus vel ex axillis defoliatis 1.2–2 cm. longis plurifloris ubique sub anthesi minute et sparse brunneo-pilosis demum glabris, pedunculo gracili (circiter 1 mm. diametro) 3–10 mm. longo, rhachi cicatricibus florum delapsorum conspicue ornata, bracteis minutis ovatis mox caducis; floribus inflorescentiae apicem versus congestis, pedicellis gracilibus ad 4 mm. longis bracteola inconspicua ovata rotundata 0.5–1 mm. longa paullo infra floris basim ornatis; perianthio carnoso cylindrico-ellipsoideo, sub anthesi 5.5–6.5 mm. longo et basim versus 2–2.5 mm. diametro, lobis 3 deltoideis subacutis circiter 1 mm. longis; androecio 4–4.5 mm. longo, stipite glabro gracili 2–3 mm. longo, antheris 10 vel 11 circiter 1.5 mm. longis, columna in apicem sterilem brevem interdum obtusa; fructibus solitariis vel binis, pedunculo (e pedicello haud distinguitur) 1.5–3 mm. crasso 7–13 mm. longo glabro; fructibus oblongo-ovoideis, 3.5–4.5 cm. longis, 1.5–2 cm. latis, utrinque obtusis (juventute subattenuatis et apice mucronatis), arcte spadiceo-puberulis mox glabris, pericarpio 1–2 mm. crasso, arillo fere a basi laciniis angustis diviso, semine ellipsoideo.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12147*, alt. 1800 m. (slender tree 5–6 m. high, frequent in seral growths of openings in mossy forest; fruit orange, the aril red); *Brass 12173* (TYPE), alt. 1800 m., January 1939 (slender tree 6–7 m. high, common in mossy forest substage); *Brass & Versteegh 11925*, alt. 1780 m. (tree 19 m. high, the trunk 35 cm. diam., the crown small, the bark black, fairly smooth, about 7 mm. thick, the wood light brown; fruits yellow-brown; rare in primary forest on slope of a ridge); 6 km. southwest of Bernhard Camp, *Brass & Versteegh 12597*, alt. 1250 m. (tree 22 m. high, the trunk 49 cm. diam., the crown not widespreading, the bark black, 5 mm. thick, with red latex, the wood light red; fruits green; occasional tree of primary forest on a ridge).

The type bears staminate inflorescences, the other specimens fruits. *Myristica pachyphylla* is closely related to *M. crassipes* Warb., differing in its thicker and proportionately broader leaf-blades, its much more slender peduncle (of both staminate and fruiting inflorescence), and its glabrous androecium-stalk.

Myristica multinervia sp. nov.

Arbor ubique praeter inflorescentiam glabra, ramulis crassis (apices versus 4–6 mm. diametro) subteretibus juventute purpurascentibus demum fusco-cinereis et copiose lenticellatis; petiolis 2.5–3 mm. dia-

metro 17–23 mm. longis profunde canaliculatis nigrescentibus; laminis siccitate tenuiter coriaceis oblongis, 20–32 cm. longis, 8.5–10 cm. latis, basi rotundatis, apice ut videtur breviter acuminatis, utrinque siccitate fuscis vel subtus pallidioribus, costa valida supra plana subtus prominente, nervis secundariis utrinsecus 27–33 patentibus margines versus anastomosantibus supra impressis subtus valde prominulis, venulis immersis; inflorescentiis ♂ axillaribus vel e ramulis infra folia orientibus, pedunculo brevi crasso et rhachi cicatricibus florum delapsorum densissime ornata 5–7 mm. diametro sub anthesi 15–35 mm. longis, bracteis mox caducis; floribus apicem rhacheos versus congestis, ubique extus breviter et densissime fulvo-tomentellis, pedicellis sub anthesi 6–8 mm. longis et circiter 1.5 mm. diametro bracteola deltoidea subacuta 4–5 mm. longa et lata apice ornatis; perianthio cylindrico-urceolato, sub anthesi 9–11 mm. longo et circiter 4 mm. diametro, lobis 3 oblongo-deltoideis obtusis 1.5–2 mm. longis; androecio 6–7.5 mm. longo, stipite crasso 2–3 mm. longo dense et breviter stramineo-sericeo, antheris 14–16, 3–3.5 mm. longis, columna in apicem sterilem conspicuum acutum circiter 1 mm. longum producta.

British New Guinea: Central Division, Dieni, Ononge Road, *Brass 3914* (A, type, NY), alt. 500 m., April 29, 1933 (specimens brought down in thick forest by a falling tree; habit uncertain; leaves pale-veined above, iridescent pale brown beneath; flowers covered with yellow-brown pubescence).

This very distinct species is readily recognized by its firm many-nerved leaf-blades with rounded base and its short stout many-flowered inflorescences. It has essentially the same type of inflorescence as *M. subalulata* Miq., from which it differs in its terete branchlets, stouter rachises, shorter pedicels, and minor characters of foliage.

Myristica sphaerosperma sp. nov.

Arbor ad 13 m. alta ubique praeter fructus glabra, ramulis subteretibus distaliter 3–5 mm. diametro fuscis verrucosis; petiolis crassis (3–4 mm. diametro) leviter canaliculatis nigrescentibus 17–25 mm. longis; laminis subcoriaceis elliptico-oblongis, 20–32 cm. longis, 6–10.5 cm. latis, basi rotundatis vel obtusis, apice caudato-acuminatis (acumine 15–25 mm. longo angusto obtuso), margine leviter recurvatis, supra fuscis, subtus cineraceis vel argenteis, costa valida supra subplana vel leviter elevata subtus valde prominente, nervis secundariis utrinsecus 20–25 arcuato-patentibus margines versus conspicue anastomosantibus supra acute impressis subtus prominentibus, venulis supra leviter impressis vel planis subtus immersis vel paullo prominulis; fructibus infra folia solitariis,

pedunculo crasso (5–7 mm. diametro) ruguloso ad 15 mm. longo; fructibus subglobosis ad 6 cm. diametro utrinque rotundatis extus rugosis densissime et arctissime rufo-tomentellis, pericarpio duro 3–4 mm. crasso, arillo fere a basi in lacinias numerosas angustas fisso, semine subgloboso 3–3.5 cm. diametro, arilli impressionibus distincte sulcato, testa pallide badia dura 0.7–1 mm. crassa.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass 4174* (A, TYPE, NY), alt. 2100 m., June 1, 1933 (rare, in foothill forest substage; erect shortly branched tree 13 m. high, with slightly fissured dark brown bark; leaves silver-gray beneath, the nerves brownish green beneath; fruit rufous-brown, the aril of unripe fruit pale yellow).

In the absence of inflorescences, this species cannot be accurately related; it is, however, amply characterized by its large thick many-nerved leaf-blades, which are whitish beneath, and by its large subglobose pubescent fruit. Its closest relative may be *M. argentea* Warb., a species with fewer secondary nerves and an ellipsoid fruit.

Myristica Brassii sp. nov.

Arbor ad 29 m. alta ubique praeter inflorescentiam et fructus et partes novellas brunneo-puberulas glabra, trunco ad 70 cm. diametro, ramulis crassis subteretibus fusco-cinereis; petiolis crassis (circiter 3 mm. diametro) 13–20 mm. longis canaliculatis nigrescentibus; laminis tenuiter coriaceis vel chartaceis ovato-oblongis, 15–24 cm. longis, 6.5–10 cm. latis, basi rotundatis vel obscure subcordatis, apice acutis vel gradatim acuminatis, margine saepe revolutis, supra fuscis, subtus paullo pallidioribus, costa valida supra prominente subtus valde prominente, nervis secundariis utrinsecus 15–17 patentibus margines versus adscendentibus et inconspicue anastomosantibus supra impressis vel costam versus prominulis subtus prominentibus, venulis utrinque obscuris vel supra immersis et subtus leviter prominulis; inflorescentiis ♂ supraaxillaribus vel e ramulis infra folia orientibus brevibus paucifloris sub anthesi ubique pallide ferrugineo-sericeis (pilis adpressis 0.2–0.5 mm. longis), pedunculo subglomerulato ad 5 mm. longo et crasso cicatricibus florum delapsorum ornato, bracteis parvis mox caducis; floribus congestis, pedicellis crassis sub anthesi 6–8 mm. longis bracteola crasso-carnosa late semiorbiculari ad 1 mm. longa 2–4 mm. infra floris basim ornatis; perianthio carnoso urceolato-ovoideo, sub anthesi 12–13 mm. longo et basim versus circiter 5 mm. diametro, demum subglabrescente, apicem versus contracto, lobis 3 oblongo-deltoideis subacutis, 1.5–2 mm. longis, 2–2.5 mm. latis; androecio quam perianthio paullo breviore, stipite glabro crasso striato 4–5 mm. longo, antheris 15–20, 4–5.5 mm. longis,

columna in apicem sterilem 0.5–1 mm. longum subacutum producta; inflorescentiis ♀ plus minusve similibus dense tomentellis (pilis 0.5 mm. longis patentibus persistentibus basim versus plumulosis); pedicellis bracteola 1–1.5 mm. infra floris basim ornatis; perianthio breviore (sub anthesi 10–11 mm. longo) circiter 6 mm. diametro; ovario ovoideo sub anthesi 4–5 mm. diametro dense pallide ferrugineo-sericeo ad apicem angustato et glabro, stigmate profunde sulcato; fructibus ut videtur solitariis, pedicello crasso (ad 10 mm. diametro) 15–20 mm. longo demum glabro; fructibus subglobosis 6–7 cm. diametro brunneo-tomentellis, pericarpio lignoso ad 1 cm. crasso, arillo fere a basi in lacinias angustas numerosas fisso, semine subgloboso in specimine nostro parvo (ad 2 cm. diametro).

Netherlands New Guinea: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12254* (type), alt. 1700 m., January 1939 (tree 6 m. high in a rain-forest gully; flowers fragrant, cream-colored); 6 km. southwest of Bernhard Camp, *Brass & Versteegh 12547,* alt. 1150 m. (frequent in primary forest, on slope of a ridge; tree 29 m. high, the trunk 70 cm. diam., the crown not wide-spreading; flowers yellow; fruits dark brown; bark 24 mm. thick, black, exuding abundant red latex; wood red).

The type bears staminate inflorescences, the other specimen pistillate inflorescences and fruits. This well-marked species bears a relationship to *M. velutina* Markgraf and *M. cucullata* Markgraf, differing from the former in its terete branchlets, broader leaf-blades, and much larger fruits, from the latter in its more obvious venation and small bracteoles, and from both in its larger flowers, long androecium-stalk, and several obvious foliage characters.

Myristica Archboldiana sp. nov.

Arbor ad 30 m. alta, ramulis apices versus purpurascentibus angulatis vel leviter 4-alatis; petiolis ut ramulis glabris gracilibus (1.5–2 mm. diametro) 2.5–3.5 cm. longis canaliculatis; laminis tenuiter coriaceis vel chartaceis elliptico-oblongis, 13–15 cm. longis, 6.5–7.5 cm. latis, basi rotundatis vel leviter subcordatis, apice cuspidatis vel breviter acuminatis, margine undulato-recurvatis, supra glabris fuscis, subtus indumento persistente arcte et densissime ferrugineo-tomentellis, costa supra acute elevata subtus prominente, nervis secundariis utrinsecus 17–21 erecto-patentibus rectis haud vel indistincte conjunctis supra acute impressis subtus valde prominulis, venulis immersis utrinque obscuris; fructibus 2 vel 3 apicem pedunculi brevis versus aggregatis, pedunculo ad 25 mm. longo et 5 mm. diametro glabro cortice soluto vestito, pedi-

cellis glabris crassis brevibus (ut videtur ad 3 mm. longis); fructibus obovoideis ad 7 cm. longis et 4 cm. diametro (paullo supra medium), basi angustatis apice rotundatis vel late obtusis, pericarpio suberoso vel demum fibroso 8–12 mm. crasso extus persistente et densissime arcte rufo- vel ferrugineo-tomentello, arillo in lacinias latas fisso, semine ellipsoideo in specimine nostro parvo (ad 2.5 cm. longo).

BRITISH NEW GUINEA: Western Division, Palmer River, 2 miles below junction with Black River, *Brass 6982* (TYPE), alt. 100 m., June 1936 (common in forest on the lower ridges; large canopy tree 30 m. tall, with a clear straight bole spurred at the very base, the bark pale brown, lenticellate, reddish when cut; leaf-blades brown beneath; ribbed above with impressed nerves; fruit rufous-brown, the aril yellow).

As this species is represented only by foliage and fruit, it cannot be accurately related, but I feel certain that it is not to be matched among described species. It is characterized by long petioles, elliptic-oblong bicolored leaf-blades which are closely and densely tomentellous beneath, and large obovoid pubescent thick-walled fruits. In fruit, the new species suggests *M. costata* Warb., from which it differs notably in the other above-mentioned characters. Discovery of flowers may indicate that *M. Archboldiana* is elsewhere related, but its leaf and fruit characters are sharply distinct from those of described Papuan species.

Myristica Schleinitzii Engl. Bot. Jahrb. **7**: 455. 1886; Warb. Nova Acta Acad. Leop.-Carol. **68**: 392, *pl. 19*. 1897; Markgraf, Bot. Jahrb. **67**: 166. 1935.

Myristica faroensis Hemsl. Ann. Bot. **5**: 506. 1891.

SOLOMON ISLANDS: Bougainville: Kieta, *Kajewski 1582*, common in rain-forest (small tree, to 17 m. high; fruit yellow-green when ripe); Karngu, Buin, *Kajewski 2236*, common in rain-forest close to seashore (small tree about 15 m. high; leaves silvery beneath; fruit yellow-green, up to 43 mm. long and 15 mm. broad, the aril bright scarlet; common name: *U-we-pekira*). Navotana I., N'Gela group: *Brass 3237*, on summit of island, alt. 50 m. (slender tree 8 m. tall; leaves gray beneath; fruit pale yellow).

This species has been reported from many collections in New Guinea and the surrounding islands, but apparently it has been previously represented from the Solomons only by Guppy's type of *M. faroensis* from Faro, in Bougainville Straits.

Myristica inutilis Rich; A. Gray, Bot. U. S. Expl. Exped. **1**: 34. 1854; Guillaumin, Jour. Arnold Arb. **14**: 59. 1933; Christophersen, B. P. Bish. Mus. Bull. **128**: 87. 1935.

Solomon Islands: Bougainville: Kieta, *Kajewski 1587,* alt. 100 m. (large tree to 20 m. high; leaf-blades light brown beneath; fruit 4.5 cm. long, 2 cm. diam., covered with short brown felt-like tomentum); Lake Luralu, Koniguru, Buin, *Kajewski 2101,* alt. 1000 m. (tree to 20 m. high; leaf-blades golden beneath; fruit 3 cm. long, 1.8 cm. diam., short brown-tomentellous; common name: *Chigui*). San Cristoval: Star Harbour, *Brass 3106,* near sea-level (small slender tree with milky sap; leaf-blades dark green above, brown beneath; fruit rusty brown). The collectors report the species as common in rain-forest.

Myristica inutilis, originally described from Samoa and recently reported by Guillaumin from the New Hebrides, is now found to extend into the Solomons. I have carefully compared the cited specimens with those mentioned by Guillaumin (*Kajewski 44, 220,* and *757*) and with an extensive series from Samoa, and am unable to find any appreciable differences among specimens from the three groups. The New Hebrides specimens bear an unpublished herbarium name, but I have no reason to doubt the correctness of Guillaumin's determinations. The absence of the species from Fiji is noteworthy and is doubtless due to lack of abundant material from that group.

Myristica inutilis is a close relative of the Papuan *M. Buchneriana* Warb., from which it is readily distinguished by the presence of copious close pale tangled tomentum on the lower surfaces of leaf-blades. In floral characters the two species are extremely close, *M. inutilis* having a larger bracteole and fewer anthers; in fruit the similarity is also striking.

Myristica salomonensis Warb. Nova Acta Acad. Leop.-Carol. 68: 527. 1897.

Solomon Islands: Guadalcanal: Ululolo, Tutuve Mt., *Kajewski 2552,* common in rain-forest, alt. 1200 m. (tree to 25 m. high, the trunk straight; fruit brown-tomentellous, with a strong spicy odor; common name: *Mansi-mansi*). Malaita: Quoi-mon-apu, *Kajewski 2373* (A, US), common in rain-forest, alt. 50 m. (small tree to 10 m. high; fruit brown-tomentellous, up to 3 by 2.5 cm.; common name: *Pai-passi*). San Cristoval: Magoha River, *Brass 2744,* common in lowland rain-forest (tree 15 m. high, the bark dark brown, slightly furrowed and flaky, the wood pale brown with darker streaks; fruit tomentellous, about 3 by 2.5 cm.).

The listed specimens are all in fruiting condition, as was the type and only previously known collection, *Comins 121,* from San Cristoval. Although I have not seen the latter specimen, I have little doubt of the

determination, as Warburg's description is ample. The leaves of the Brass specimen are slightly larger (to 17 by 6 cm.) than those mentioned in the original description. While the place of *M. salomonensis* in the genus must remain uncertain until flowers are available, it seems to be allied to *M. Buchneriana* Warb., differing obviously in fruit shape and details of foliage.

Myristica platyphylla sp. nov.

Arbor ad 20 m. alta, trunco interdum conspicue erismatico, ramulis crassis subteretibus vel obscure biangulatis; petiolis crassis (3–4 mm. diametro) 17–25 mm. longis conspicue canaliculatis; laminis chartaceis elliptico- vel leviter obovato-oblongis, 20–32 cm. longis, 7–13 cm. latis, basi obtusis, apice ut videtur breviter cuspidatis, supra fuscis nitidis glabris, subtus indumento pallide brunneo-tomentello arcto persistente densissime indutis, costa valida supra lata subplana vel leviter elevata subtus valde prominente, nervis secundariis utrinsecus 25–31 erecto-patentibus rectis margines versus inconspicue anastomosantibus supra leviter impressis subtus valde prominulis, venulis immersis plerumque utrinque obscuris; inflorescentiis ♂ supraaxillaribus vel e ramulis infra folia orientibus 1–1.5 cm. longis multifloris ubique praeter pedunculum densissime ferrugineo-tomentellis (pilis minutis e basi pauciramosis), pedunculo crasso basim versus 2–4-furcato, rhachibus brevibus crassis conspicue cicatricosis, bracteis minutis mox caducis; floribus inflorescentiae apices versus dense congestis, pedicellis gracilibus ad 4 mm. longis bracteola tenuiter carnosa deltoideo-ovata 2–2.5 mm. longa et lata subacuta intus glabra apice ornatis; perianthio ellipsoideo 4.5–5 mm. longo 2–3 mm. diametro, lobis 3 deltoideis subacutis 1–1.5 mm. longis et latis; androecio 4–4.5 mm. longo, stipite crasso striato 1.5–2 mm. longo basim versus pilis brevibus stramineis adscendentibus obscure piloso, antheris 8 vel 9, 2–2.5 mm. longis, columna in apicem sterilem brevem obtusa; fructibus 2–4 aggregatis, pedunculo crasso brevi, pedicellis 3–5 mm. crassis 4–8 mm. longis demum glabrescentibus; fructibus late ellipsoideis circiter 3 cm. longis et 2.5 cm. latis, longitudinaliter sulcatis, utrinque rotundatis vel apice inconspicue mucronatis, pericarpio duro 3–4 mm. crasso extus densissime et arcte pallide brunneo-tomentello, arillo fere a basi in lacinias latas paucas irregulariter fisso, semine oblongo-ellipsoideo ad 20 mm. longo et 13 m. lato.

SOLOMON ISLANDS: Bougainville: Kugumaru, Buin, *Kajewski 1916*, alt. 150 m. (large tree to 20 m. high; leaf-blades brown beneath; fruit covered with brown tomentum and longitudinally dehiscing

on one side; common name: *Chigui*). Guadalcanal: Berande, *Kajewski 2442* (TYPE), near sea-level, January 14, 1931 (large tree to 20 m. high, with large buttresses; leaf-blades green above, light brown beneath; buds brown-tomentellous; common name: *Toro-bagere;* latex reported used to check nasal haemorrhages).

Myristica platyphylla, said to be common in rain-forest, seems very distinct and without close relatives among described Papuasian species. It is at once distinguished by its large many-nerved leaf-blades which are persistently tomentellous beneath, its short stout branched many-flowered staminate inflorescences, and its comparatively small tomentellous fruits. According to Markgraf's key, it may be placed near *M. Buchneriana* Warb., but the differences in foliage and fruit are very pronounced. A closer relative appears to be the Philippine *M. Wenzelii* Merrill, a species with ultimately glabrous leaf-blades, simple or obscurely forked staminate inflorescences, shorter pedicels, and more numerous anthers. The type of *M. platyphylla* bears staminate inflorescences, the other specimen being in fruit.

Myristica cerifera sp. nov.

Arbor ad 25 m. alta ubique praeter inflorescentiam et fructus glabra, ramulis subteretibus crassis (3–6 mm. diametro) rugosis; petiolis nigrescentibus crassis (3–4 mm. diametro) 15–25 mm. longis conspicue canaliculatis; laminis chartaceis elliptico-oblongis, 30–40 cm. longis, 8–12.5 cm. latis, basi obtusis vel rotundatis, apice obtusis vel obtuse cuspidatis, margine paullo undulatis, supra fuscis nitidis, subtus levibus et manifeste argenteo- vel cinereo-ceriferis, costa valida supra lata et prominente subtus valde prominente, nervis secundariis utrinsecus 25–30 basim versus valde adscendentibus distaliter arcuato-adscendentibus margines versus inconspicue anastomosantibus supra leviter impressis subtus valde prominulis, venulis immersis utrinque obscuris vel supra leviter impressis et subtus minute prominulis; inflorescentiis ♀ vetustis e ramulis defoliatis orientibus vermiformibus 2.5–3.5 cm. longis multifloris, pedunculo brevi crasso 2- vel 3-furcato, rhachibus crassis (6–10 mm. diametro) conspicue et densissime cicatricosis; floribus inflorescentiae apices versus dense congestis ubique extus dense et breviter ferrugineo-tomentellis, pedicellis brevissimis bracteola chartacea late ovata circiter 3 mm. longa et 7 mm. lata obtusa apice ornatis; perianthio crasse carnoso ellipsoideo 6–7 mm. longo (ante anthesi) 5–6 mm. diametro, lobis 3 vel 4 deltoideo-oblongis acutis circiter 3 mm. longis et latis; ovario ovoideo densissime brunneo-strigoso, stigmate profunde lobato

glabro; fructus pedunculo pedicellisque valde incrassatis; fructibus paucis (solitariis?) oblongo-ellipsoideis, 5–8 cm. longis, 4–5 cm. latis, utrinque rotundatis vel apice inconspicue mucronatis, pericarpio lignoso 5–10 (ad 17 ex Kajewski) mm. crasso extus conspicue et valdissime verrucoso arcte brunneo-tomentello demum glabro, arillo crasso fere a basi in lacinias latas fisso, semine oblongo-ellipsoideo ad 45 mm. longis et 18 mm. latis (ad 56 × 21 mm. ex Kajewski), testa castanea dura circiter 1 mm. crassa arilli impressionibus conspicue sulcata.

SOLOMON ISLANDS: Bougainville: Kugumaru, Buin, *Kajewski 1827* (TYPE), alt. 150 m., June 7, 1930, common in rain-forest (large tree to 25 m. high; leaf-blades silvery beneath; fruit brown, rough-surfaced; common name: *Or-wu-pekira;* seeds pulverized and used to stop leaks in canoes); Siwai, *Waterhouse 166* (NY, Y) (large tree; fruits woody, the aril red; common names: *Voraga, Mu*).

Both the cited specimens are in fruit, and the type also retains some old pistillate inflorescences. The species is readily recognized by its large leaf-blades, which are covered on the lower surface by a uniformly thick layer of wax, its stout vermicular inflorescences, and its large thick-walled verrucose fruits. Its leaf-shape and the form of its inflorescence indicate a relationship with the preceding new species (*M. platyphylla*), but the waxy foliage and the fruits yield strikingly distinct characters.

Myristica Clemensii sp. nov.

Arbor ubique praeter inflorescentiam et partes novellas parce et breviter ferrugineo-strigillosas glabra, ramulis gracilibus subteretibus interdum leviter flexuosis; petiolis gracilibus (1–1.5 mm. diametro) nigrescentibus 12–17 mm. longis canaliculatis; laminis chartaceis siccitate fuscis et concoloribus anguste elliptico-oblongis, 8–11 cm. longis, 1.8–2.8 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis vel gradatim et obtuse acutis, margine valde revolutis, subtus inconspicue ceriferis, costa valida supra impressa vel leviter elevata subtus prominente, nervis secondariis utrinsecus 15–20 brevibus patentibus rectis inconspicue anastomosantibus supra leviter impressis subtus subplanis vel inconspicue prominulis, venulis immersis vel supra paullo impressis; inflorescentiis ♂ supraaxillaribus simplicibus, pedunculo circiter 2 mm. longo et 1.5 mm. diametro apice incrassato et paucifloro mox glabro, bracteis parvis ovatis strigosis; floribus fasciculatis, pedicellis gracilibus sub anthesi 3–4 mm. longis bracteola ovato-deltoidea circiter 1 mm. longa et 2 mm. lata obtusa apice ornatis; perianthio cylindrico-ellipsoideo 5–6 mm. longo 2–3 mm. diametro, lobis 3 (vel 4) oblongo-deltoideis circiter 2

mm. longis et latis; androecio 3.5–5 mm. longo, stipite crasso 1–1.5 mm. longo parce et breviter stramineo-strigilloso, antheris 10–15, 1.5–3 mm. longis, columna in apicem sterilem conspicuum circiter 0.5 mm. longum obtusum producta.

Northeastern New Guinea: Morobe District, Wareo, *Clemens 1668* (type), alt. 600–650 m., January 17, 1936.

Myristica Clemensii is related to *M. Macgregorii* Warb., from which it differs in its much narrower leaf-blades, which are brownish and concolorous rather than glaucous beneath, its more numerous and less conspicuous secondary nerves, and its much shorter pedicels. In other floral characters the two species are quite similar, but foliage differences in texture and venation, as well as in shape, are pronounced.

Myristica procera sp. nov.

Arbor procera, ramulis gracilibus (apices versus 2–4 mm. diametro) subteretibus juventute arcte ferrugineo-tomentellis demum glabris cinereis rugosis; petiolis crassis (2–3 mm. diametro) 12–15 mm. longis profunde canaliculatis ut ramulis juventute tomentellis; laminis subcoriaceis siccitate fusco-castaneis concoloribus elliptico-oblongis, (14–)20–25 cm. longis, 4–6 cm. latis, basi obtusis et in petiolum decurrentibus, apice gradatim et longe acutis (acumine ipso obtuso), margine leviter undulatis, supra glabris, subtus indumento pallide ferrugineo arcto persistente densissime tomentellis, costa supra leviter elevata subtus prominente, nervis secondariis utrinsecus 16–19 erecto-patentibus margines versus leviter arcuatis et anastomosantibus supra paullo impressis subtus prominulis, venulis immersis utrinque obscuris vel supra leviter impressis; fructibus solitariis axillaribus vel e ramulis inter folia orientibus, pedunculo (a pedicello haud distincto) crasso (3–3.5 mm. diametro) 6–7 mm. longo tomentello; fructibus ellipsoideis ad 2.5 cm. longis et 1.7 cm. latis, longitudinaliter conspicue sulcatis, basi obtusis, apice rotundatis et oblique apiculatis, pericarpio duro circiter 1.5 mm. crasso extus densissime et arcte ferrugineo-tomentello, arillo fere a basi in lacinias paucas latas fisso, semine oblongo-ellipsoideo.

Solomon Islands: Ysabel: Tatamba, *Brass 3434* (type), alt. 50 m., January 5, 1933, common in rain-forest (tall slender tree, the bark gray, slightly fissured, the branchlets rusty brown; upper surface of leaf-blades smooth, covered with gray bloom, the lower surface rusty-tomentose).

Myristica procera, a species characterized by the close persistent tomentum of the lower surface of leaf-blades and the fruit, appears not

to be closely related to any described Papuasian or Pacific species, and in the absence of flowers I cannot indicate a probable relationship. In its pubescence and general leaf-shape it bears a resemblance to the Philippine *M. guatteriaefolia* A. DC., but the relationship is probably not close. At the same time and in the same locality as the type of *M. procera* was obtained, Brass collected another species in fruit, referring it to his number *3434A*. I have described this above as *M. petiolata;* the two species are not closely related.

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ADDITIONS TO OUR KNOWLEDGE OF THE FIGS OF NEW GUINEA*

V. S. Summerhayes

In 1935 Diels (Engl. Bot. Jahrb. 67: 177–235) published an account, with analytical keys, of all the *Ficus* species recorded from the island of New Guinea and the neighbouring Bismarck Archipelago, in which our knowledge of this genus was brought up to date.

Since then several valuable collections of figs made in New Guinea have been placed in my hands for study, resulting in the addition of many records to those given by Diels and the description of several new species. The notes here offered are based mainly on the collections of the first two Archbold Expeditions in 1933–4 and 1936–7, for the material of which I am indebted to the New York Botanical Garden and the Arnold Arboretum respectively; a complete account is given of these two collections. There are also included a number of interesting records from the large collections made in Eastern Papua by C. E. Carr, some of whose specimens have not yet been worked out finally, and from sundry other collections. I hope later to publish a further paper dealing with those specimens not cited here. For convenience the sequence followed is that of Diels, except in certain cases in which I disagree with his conclusions; these changes are commented on where they occur. It should not be assumed, however, that in the absence of comment I am necessarily in agreement with Diels, as the position of some species is still under consideration.

Sect. Urostigma

Ficus sterrocarpa Diels in Engl. Bot. Jahrb. 67: 179 (1935).

Papua: Central Division, Boridi, 1500 m. alt., in forest, tree 24 m., fruit yellow-green, September 1935, *Carr 13371*.

Ficus sclerotiara Diels, l.c. 180.

Papua: Western Division, Fly River, 528 mile Camp, 80 m. alt., common large canopy tree (not constricting) on the ridges, grey, slightly flaky bark, dry stipules persistent, fruit green, very hard, ± 3.5 cm. diam., solitary or in pairs in upper leaf axils, May 1936, *Brass 6686*.

*Botanical Results of the Richard Archbold Expeditions.

This specimen differs from the specimens cited by Diels (*Schlechter 17765, 17501*) in the slightly different venation of the leaves and the glabrous stipules, stem, peduncles and receptacles. In floral structure, however, there is complete agreement.

Ficus myrmekiocarpa Summerhayes, sp. nov.; a *F. Watkinsiana* F. M. Bail. foliis majoribus latioribusque, receptaculis ellipticis paulo majoribus ostiolo latiore rotundato, florum masculorum bracteolis ellipticis, stigmate bifido differt.

Arbor magna; ramuli crassi, apice circiter 1 cm. diametro, glabri, cortice brunneo fere laevi obtecti, cicatricibus foliorum et stipularum delapsorum distincte notati. Folia longe petiolata, late vel anguste elliptica, apice cuspidato-acuminata, basi obtusa vel late cuneata, 12–27 cm. longa, 6–12 cm. lata, tenuiter coriacea, glaberrima, costa supra subimpressa subtus prominente, nervis lateralibus utrinsecus 20–30 infimis e costa angulo acuto exortis ceteris curvatim subpatentibus ± parallelis prope marginem nervo submarginali undulato conjunctis, nervis secundariis numerosis distinctis fere prominulis, rete venularum crebro indistincto; petiolus subteres, supra canaliculatus, 5–9 cm. longus, 2–4 mm. diametro, glaber, cortice brunneo leviter ruguloso obtectus; stipulae lanceolatae, acuminatae, usque ad 20 cm. longae, glabrae. Receptacula axillaria, bina vel abortu solitaria, pedunculata, ellipsoidea vel ovoideo-ellipsoidea, 3.5–4.5 cm. longa, 2.5–3 cm. diametro, apice producta, obtuse mammilliformia, 5 mm. alta et fere 1 cm. diametro, glabra vel sparse papillato-puberula, obtuse et indistincte verruculosa, valde indurata, aurantiaco-rubra, ostiolo vix prominente bracteis tribus incurvatis instructo; pedunculus 1–2 cm. longus, 4–5 mm. diametro, glaber, apice in discum cupularem pubescentem vel glabrum 8–15 mm. diametro dilatatus. Flores saepius e processubus irregularibus lignosis usque ad 7 mm. altis e pariete receptaculi ortis enati, cum squamis numerosis linearibus brunneis commixti. Flores masculi saepius ex apicibus processuum enati, usque ad 2.5 mm. pedicellati, bracteolis (apice pedicelli sitis) ovatis vel ellipticis 2–2.5 mm. longis; perianthii segmenta 3–4 orbicularia, rotundata, 1.6 mm. longa, rubro-brunnea, antheram aequantia; anthera subsessilis, reniformi-oblonga. Flores feminei e lateribus processuum vel rarius e pariete receptaculi enati, sessiles; perianthii segmenta 1–3, lanceolata, acuminata, 1–3 mm. longa, linea media rubra instructa; ovarium ± ovoideum sed saepius angulare, 2–3 mm. altum, intense rubro-brunneum, stylo infra-apicali vel laterali tenui usque ad 4 mm. longo, stigmate bifido segmentis filiformibus inclusis usque ad 1.5 mm. longo.

PAPUA: Western Division, Wuroi, Oriomo River, 5 m. alt., in river-

bank forest fringe, one example, spreading tree, 15 m. high, receptacles orange-red, January–March 1934, *Brass 5773* (TYPE); Lower Fly River, east bank opposite Sturt Island, on bank in rain forest, large tree, leaves greyish beneath, fruit hard, orange-red, October 1936, *Brass 8099*.

Evidently a close relative of *F. Watkinsiana* F. M. Bailey from Queensland, which has the same type of receptacle but differs in a number of minor points, particularly in the floral structure. The most striking difference is in the apex of the receptacle which in the Australian species is drawn out into a sort of short narrow proboscis but in *F. myrmekiocarpa* is broad and rounded resembling a mammilla. The specific epithet is given in allusion to the wart-like irregularities of the receptacle wall.

Ficus mafuluensis Summerhayes, sp. nov.; ab omnibus aliis speciebus novoguineensibus subsectionis (*Elasticarum*) receptaculis sessilibus usque ad 6–7 cm. longis induratis apice bracteis duabus compressis carinatis induratis coronatis distinguitur.

Arbor parva, epiphytica; ramuli erecti, crassi, apice 1 cm. diametro, sparse pubescentes, glauci, cicatricibus foliorum et stipularum delapsorum distincte notati. Folia longe petiolata, late elliptico- vel oblongo-lanceolata, apice breviter et subito acuminata, basi late cuneata, usque ad 24 cm. longa et 10 cm. lata, costa supra prominula subtus prominente ut nervi rubra, nervis lateralibus utrinsecus 20–25 duabus infimis angulo acuto exortis ceteris fere patentibus parallelis juxta marginem cum nervo submarginali leviter multiarcuato conjunctis utrinque prominulis, nervis secundariis numerosis, rete venularum indistincto, tenuiter coriacea, utrinque glabra, supra ± nitentia; petiolus semiteres, supra canaliculatus, 5–7 cm. longus, 3.5 mm. diametro, sparse pubescens, ruber; stipulae lanceolatae, acuminatae, 25–30 cm. longae, extra dense sericeo-canescentes, rubrae. Receptacula axillaria, bina, sessilia, ovoideo-cylindrica vel ovoidea, usque ad 6–7 cm. longa et 3.5–4 cm. diametro, leviter compressa et indistincte 2–4-costata, glabra, aurantiaca, indurata, basi disco cupulari pubescente 1–1.5 cm. diametro instructa, ostiolo prominente bracteis duabus oppositis compressis carinatis induratis instructo. Flores masculi cum femineis commixti, usque ad 2 mm. longe pedicellati, basi bracteolis duabus lineari-lanceolatis vel lanceolatis instructi; perianthii segmenta 3 vel 4, orbicularia, fere 2 mm. longa, pallide flavescentia; anthera sessilis, compressa, reniformis, 2 mm. lata. Flores feminei sessiles; perianthii segmenta 3–4, lineari-lanceolata, rubro-brunnea, 1–2 mm. longa; ovarium ovoideum vel ± globosum, 1.5–2 mm. altum, atro-brunneum, stylo laterali tenui, stigmate breviter bifido pallidiore.

PAPUA: Central Division, Mafulu, 1200 m. alt., in lower primary forest, uncommon, epiphyte in crown of a very large tree, robust species attaining the proportions of a small tree, branchlets erect, these and petioles glaucous, leaves slightly concave, midrib and nerves red, stipules red, receptacles hard, orange, in axillary pairs, 6–7 cm. long, 3.5–4 cm. diam., September–November 1933, *Brass 5398*.

Easily distinguishable from other Papuan representatives of Sub-Sect. *Elasticae* by the fruit characters as mentioned in the diagnosis. The species resembles *F. pleurocarpa* but differs in a number of minor points such as the indumentum of the twigs, the venation of the leaves, the stipules and the stigmas. Unfortunately, I have not seen authentic material of *F. pleurocarpa* but sterile material in the Brisbane Herbarium, some from the type locality, agrees pretty well with the original description.

Ficus Archboldiana Summerhayes, sp. nov.; a *F. elastica* Roxb. foliis minoribus, receptaculis globosis bracteis ± orbicularibus persistentibus, a *F. retusa* L. foliis coriaceis nervis lateralibus numerosis subaequalibus, receptaculis bracteisque majoribus, ab utraque florum femineorum perianthio gamophyllo, anthera valde exserta differt.

Arbor juventute epiphytica, usque ad 25 m. alta, omnino glaberrima; ramuli siccitate longitudinaliter rugulosi, cortice atro-brunneo obtecti. Folia modice petiolata, elliptica, oblongo-elliptica vel elliptico-oblanceolata, apice subito breviter apiculato-acuminata, basi rotundata usque cuneata, 6–11 cm. longa, 3–5.5 cm. lata, tenuiter coriacea, costa supra prominula subtus prominente, nervis lateralibus numerosis subaequalibus ± parallelis marginem versus reticulato-conjunctis nervum submarginalem irregularem efformantibus, utrinque laevia, supra subnitida; petiolus semiteres, supra anguste canaliculatus, 1.5–3 cm. longus; stipulae lanceolatae, acuminatae, extra atro-brunneae, intus pallidiores, usque ad 2.5 cm. longae. Receptacula axillaria, bina, sessilia, globosa, ± 1.3 cm. diametro, bracteis basalibus tribus subreniformi-orbicularibus vel orbicularibus 6–7 mm. longis 6–8 mm. latis persistentibus instructa, ochracea vel rubro-brunnea, laevia, ostiolo vix distincto bracteis incurvatis, extra et intus glabra. Flores masculi, feminei cecidiophori et feminei per totum receptaculum commixti. Flores masculi sessiles; perianthium gamophyllum, turbinato-tubulosum, apice irregulariter fissum, 1.5 mm. longum, rubro-brunneum; stamen 1, perianthium duplo superans. Flores feminei cecidiophori sessiles; perianthii segmenta 3–4, ligulata, subacuta vel obtusa, 1.5 mm. longa, rubro-brunnea; ovarium obovoideum, 1 mm.

longum, crasse stipitatum, stylo apicali brevi. Flores feminei sessiles; perianthii segmenta 3–4, ligulata, 1.5 mm. longa, rubro-brunnea; ovarium sessile, late ovoideum vel ovoideo-globosum, 1 mm. longum, stylo subapicali, stigmate acute clavato atro-brunneo.

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, common in rain forest, large constricting fig, fruit soft, globose, reddish-brown, ± 1.3 cm. diam., October 1936, *Brass 8065* (TYPE). Central Division, Koitaki, 1500 ft. alt., in forest, tree 24 m., receptacles axillary, ochre, July 1935, *Carr 12778*.

From Diels' description (I have not seen any specimens) I have little doubt that this is identical with the plants described by him as *F. retusa* var. *papuana*. As, however, Diels refers to three of the same specimens under *F. elastica* Roxb., he must have felt doubtful as to the affinity of the plants he had before him. In my opinion the species is not at all closely related to *F. retusa* L. which has very different leaf texture and venation as well as differing in floral characters. The leaves of *F. elastica* more closely approach those of *F. Archboldiana* but the floral differences are considerable. In *F. Archboldiana* the stamen is long exserted from the gamophyllous more or less tubular perianth in which respect the species approaches *F. prolixa* Forst., *F. insignis* Kurz and *F. geniculata* Kurz. *Ficus prolixa* has thinner leaves with definitely unequal lateral nerves and smaller differently coloured receptacles. The other two species differ markedly from *F. Archboldiana* in most characters apart from the stamens.

Ficus regnans Diels in Engl. Bot. Jahrb. **67**: 182 (1935).

PAPUA: Central Division, Rouna, 420 m. alt., climber on rocks in wood on very steep hillside, receptacles axillary, reddish purple when ripe, May 1935, *Carr 12342*.

Ficus rhizophoriphylla King in Jour. Asiat. Soc. Bengal **55**[2]: 410 (1887).

PAPUA: Western Division, Wuroi, Oriomo River, 30 m. alt., small tree epiphytic on large savannah tree, January–March 1934, *Brass 6018;* Lake Daviumbu, Middle Fly River, in rain forest, large constricting tree, fruit hard, orange-red, September 1936, *Brass 7703;* same locality, large constricting fig of rain-forest canopy, fruit hard, orange-coloured, 10 mm. long, 8 mm. diam., September 1936, *Brass 7759;* Upper Wassi Kussa River, left branch, common tree on river-banks in rain forest, midrib of leaf white, fruit soft, orange-red, compressed, January 1937, *Brass 8616;* Tarara, Wassi Kussa River, occasional in rain forests, large strangling fig, fruit slightly compressed, yellow, "grass" skirt material obtained

from fibrous inner bark of aerial roots, January 1937, *Brass 8712;* Central Division, Koitaki, 480 m. alt., in forest, strangling epiphyte, receptacles axillary, deep orange, June 1935, *Carr 12655;* Koitaki, 450 m. alt., in forest, tree 4.5 m., receptacles axillary, orange, July 1935, *Carr 12893;* Boridi, 1200 m. alt., in forest, tree 42 m., originated as a strangling epiphyte, receptacles axillary, yellowish ochre, September 1935, *Carr 14292.*

Ficus garciniifolia Miq. Ann. Mus. Lugd.-Bat. **3:** 218 (1867).

PAPUA: Central Division, Koitaki, 450 m. alt., on stream bank in open country, tree 12 m., receptacles axillary, yellow-green, April 1935, *Carr 11971.*

A new record for the island, the species being previously known only from Timor.

Ficus retusa L. Mant. 129 (1767).

PAPUA: Western Division, Mabaduan, in swampy rain forest, large constricting fig, ripe fruits purple-black, soft, 9–10 mm. diam., April 1936, *Brass 6549;* Lower Fly River, east bank opposite Sturt Island, rain forest, large strangling fig common on riverbanks, ripe fruit soft, smooth, black, ± 1 cm. diam., October 1936, *Brass 8084;* Central Division, Rona, Laloki River, 450 m. alt., common in rain forests, large constricting species, branches spreading flatly, leaves dark, nerves pale, unripe receptacles about 1 cm. diam., yellow with paler dots, March 1933, *Brass 3592;* Hisiu, in copses in open savannah near sea-shore, tree 15 m., receptacles axillary, when ripe green with a pale pink tinge, February 1935, *Carr 11394;* same locality and habitat, tree 6 m. with many adventitious roots, receptacles axillary, yellow, February 1935, *Carr 11441* — native name, Magi; Veiya, in swamp forest, sea level, tree 15 m., receptacles axillary, green, March 1935, *Carr 11588;* Koitaki, 450 m. alt., in forest, strangling epiphyte, receptacles axillary, red, April 1935, *Carr 12092;* Rouna, 180 m. alt., open savannah land, limbing on rocks, receptacles axillary, green suffused red, June 1935, *Carr 12484.*

Ficus benjamina L. Mant. 129 (1767).

PAPUA: Western Division, Lake Daviumbu, Middle Fly River, in lake-shore rain forest, large constricting fig, fruit green, September 1936, *Brass 7702;* Lower Fly River, east bank opposite Sturt Island, in rain forest, large strangling tree of the canopy layer, branches weak, drooping, fruit pink, hard, October 1936, *Brass 7989;* Central Division, Rouna, N. bank of Laloki River, 210 m. alt., tree 9 m., receptacles axillary, green with whitish warts, May 1935, *Carr 12420;* locality,

habitat and habit as last, receptacles blackish pink when ripe, May 1935, *Carr 12421;* Rouna, S. bank of Laloki River, among rocks, tree 4.5 m., receptacles axillary, bright rose, May 1935, *Carr 12435;* Koitaki, 450 m. alt., in forest, climber, receptacles axillary, deep pinkish purple, June 1935, *Carr 12706.*

Ficus lacor Buch.-Ham. in Trans. Linn. Soc. Lond. **15:** 150 (1827).

Ficus infectoria Roxb. Hort. Bengal. 66 (1814), nomen, Fl. Ind. **3:** 551 (1832), non Willd.

PAPUA: Central Division, Kanosia, in mangrove swamps, tree 15 m., receptacles axillary, pink, purple and soft when mature, January 1935, *Carr 11017;* Rouna, 210 m. alt., in open savannah land, shrub 3 m., receptacles axillary, bright pink, May 1935, *Carr 12422.*

Ficus stipulosa (Miq.) Miq. Ann. Mus. Lugd.-Bat. **3:** 287 (1867).

PAPUA: Central Division, Rouna, 390 m. alt., open country, tree 15 m. tall, receptacles axillary, purple when ripe, July 1935, *Carr 12814.*

This species is another addition to the New Guinea *Ficus* list, it having been recorded previously only from the Philippines.

Ficus glabella Bl. Bijdr. 452 (1825).

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, in rain forest, large constricting trees spreading long branches over river, young fruit green speckled with pink, October 1936, *Brass 8071.*

TERRITORY OF NEW GUINEA: Morobe Distr., near Andarova village, in forest on mountain side, 1500 m. alt., tree, sterile, December 1936, *Blackwood 126* — vern. name, yefeva.

Ficus pilosa Reinw. in Bl. Bijdr. 446 (1825).

Ficus chrysochlamys Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Südsee 274 (1901).

PAPUA: Western Division, Mabaduan, common on granite coast, large constricting fig to 20 m. high, leaves glossy above, midrib white, receptacle small, beaked, April 1936, *Brass 6479;* Lake Daviumbu, Middle Fly River, in rain forest on shore of lake, large constricting fig, leaf-nerves pale, August 1936, *Brass 7481;* Lower Fly River, east bank opposite Sturt Island, common on banks of river in rain forest, large low-spreading tree, fruit in pairs one ripening long before the other, soft, purple-black, 3 cm. long, 2 cm. diameter, October 1936, *Brass 8075;* Upper Wassi Kussa River, left branch, in rain forest, tree 15 m. overhanging river, leaf-nerves white, fruit hard, red flecked with white,

January 1937, *Brass 8615;* Central Division, Kanosia, 60 m. alt., in secondary forest, spreading tree up to 18 m., receptacles axillary, orange when ripe, February 1935, *Carr 11062.*

Ficus chrysochlamys Lauterb. & K. Schum. is, in my opinion, quite incorrectly referred by Diels to *F. Forstenii* Miq. which, at any rate as regards the type form, does not appear to occur in New Guinea.

Ficus patellifera Warb. in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee 241 (1905).

PAPUA: Central Division, Dieni, Ononge Road, 500 m. alt., rain forest, large constricting tree, leaves flat with recurved tip and pale nerves, April 1933, *Brass 3857.*

This species resembles closely certain forms of *F. Forstenii* Miq. and may yet prove to be a variety of that species.

Ficus sp.

PAPUA: Central Division, Mafulu, 1250 m. alt., planted in villages, very large dense-foliaged spreading tree, leaves dark, smooth, midrib white, receptacles red when ripe, September–November 1933, *Brass 5433.*

I have not been able to identify this with any native or exotic fig. In view of the pantropical distribution of sect. *Urostigma* and the poor material of the above collection, I think it best left undetermined.

Sect. SYCIDIUM

Ficus mangiferifolia Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Südsee 275 (1901).

PAPUA: Central Division, Rona, Laloki River, 450 m. alt., common in rocky river bed, tree 3–5 m., branching from near base, young leaves yellow-green, terminal bud red, receptacles yellow, tinged red with pale tubercles, 1.3–1.4 cm. diam., March 1933, *Brass 3588;* same locality, 500 m. alt., rocky creek-bed in rain forest, tree 4 m., fruit red spotted with yellow, soft, about 1.5 cm. long and in diam., February 1936, *Brass 6204;* Rouna (= Rona), 210 m. alt., in an island in the Laloki River, tree 12 m., receptacles axillary, pinkish orange, May 1935, *Carr 12416.*

TERRITORY OF NEW GUINEA: New Britain, between Baining Mts. and Toma, *Bateson 128;* Möwehafen, sea level, tropical forest, tree, June 1937, *Blackwood 301.* — vern. name, "imyi" or "imi."

Ficus dichroa Summerh. in Jour. Arnold Arb. **10:** 147 (1929).

PAPUA: Central Division, Kanosia, sea level, in secondary forest, tree 4.5 m., receptacles axillary, single or paired, dull red, February 1935, *Carr 11208.*

Ficus subulata Bl. Bijdr. 460 (1825).

PAPUA: Central Division, Mafulu, 1250 m. alt., forest, small epiphytic tree, receptacles orange-red, 1.1–1.2 cm. diam., September–November 1933, *Brass 5209;* Bella Vista, 1450 m. alt., forest below Oak associations, small spreading tree or large bush 3 m. high, receptacles orange-red, November 1933, *Brass 5442;* Veiya, sea level, in forest, forming dense undergrowth and climbing up trees, receptacles axillary, dark red when ripe, March 1935, *Carr 11690;* Koitaki, 450 m. alt., open place by stream, tree 6 m., receptacles axillary, bright orange-red, April 1935, *Carr 11927;* Boridi, 1050 m. alt., forest, climber, receptacles axillary, red, October 1935, *Carr 14732;* North-Eastern Division, Kokoda, 360 m. alt., forest, small tree, September 1933, *Cheesman 90.*

Ficus philippinensis Miq. in Hook. Lond. Jour. Bot. **7**: 435 (1848).

Ficus Decaisneana Miq.; Summerhayes in Jour. Arnold Arb. **14**: 62 (1933).

PAPUA: Western Division, Wuroi, Oriomo River, January–March 1934, *Brass 5889;* Central Division, Koitaki, 450 m. alt., bank of stream, tree 12 m., receptacles axillary, ochre-yellow speckled brown, April 1935, *Carr 11906;* Rouna, 420 m. alt., open savannah land, tree 4.5 m., receptacles axillary, pale pinkish olive with an apical green ring, laxly speckled pale brown, May 1935, *Carr 12331;* North-Eastern Division, Kokoda, 360 m. alt., forest, tree 18 m., May 1933, *Cheesman 26;* same locality and altitude, clearing near police-station, tree 15 m., June 1933, *Cheesman 53;* as last, in clearing, tree 18 m., August 1933, *Cheesman 86.*

TERRITORY OF NEW GUINEA: Kelel, 200 m. alt., by mountain stream, tree, September 1907, *Schlechter 16508.* New Britain, Gazelle Peninsula, between Kabakada mission and Vunairima, large tree, December 1934, *Waterhouse 898* — vern. name, "Naqala."

Diels completely omits this species from his account of the genus, but the specimens cited above agree well with many from the Philippines and elsewhere.

Ficus hylobia Diels in Engl. Bot. Jahrb. **67**: 186 (1935).

PAPUA: Central Division, Lala River, 1500 m. alt., forest, tree 12 m., receptacles axillary, green, red inside, February 1936, *Carr 15711;* same locality and habitat, tree 9 m., receptacles axillary, green, February 1936, *Carr 15797.*

Dissections of receptacles of two of the three gatherings cited by Diels revealed female flowers only. This, in conjunction with the floral structure and general appearance, suggests that sect. *Sycidium* is the correct position of this species.

Ficus androbrota Summerh. in Jour. Arnold Arb. **10:** 143 (1929).

PAPUA: Western Division, Gaima, Lower Fly River, east bank, common about rain-forest edges, erect tree 6–8 m. high, leaf-nerves pale, fruit 1.1–1.2 cm. diam., November 1936, *Brass 8298;* Wassi Kussa River, Tarara, at margin of rain forest, small tree, fruits soft, purple-black, December 1936, *Brass 8548.*

Ficus gibbosa Bl. Bijdr. 466 (1825).

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, on river bank in rain forest, thick foliaged tree 5 m. high, ripe fruit soft, red, depressed-globose, 1.5–1.7 cm. diam., October 1936, *Brass 8077;* Central Division, Rona, Laloki River, 450 m. alt., common in gully rain forest associations, tree 10–12 m., long flatly spreading branches, receptacles soft dark red, 1.5 × 1.2 cm., March 1933, *Brass 3572;* Mafulu, Auga River, 580 m. alt., among rocks on river bank, small grey-barked tree 3 m. high, leaves stiff, pale with whitish midrib and nerves, receptacles slightly scabrous, orange-red, 1.2–1.4 cm. diam., November 1933, *Brass 5497;* Kanosia, at edge of mangrove swamp, tree 9 m., receptacles axillary, golden-yellow, February 1935, *Carr 11529;* Rouna (= Rona), 210 m. alt., forest on N. bank of Laloki River, tree 4.5 m., receptacles green with reddish brown spots, May 1935, *Carr 12413;* Rouna, 210 m. alt., open savannah land, tree 4 m., receptacles golden-yellow, June 1935, *Carr 12486;* Koitaki, 450 m. alt., forest, tree 24 m., receptacles red, July 1935, *Carr 12876.*

The New Guinean plants of this affinity are, I think, best referred to *F. gibbosa* Bl. *Ficus tinctoria* Forst. f., to which Diels reduces *F. gibbosa,* is a Pacific Island species not occurring farther west than the Bismarck Archipelago.

Ficus leptodictya Diels in Engl. Bot. Jahrb. **67:** 196 (1935).

PAPUA: Central Division, Boridi, 1350 m. alt., forest, tree 12 m., receptacles dark red when mature, November 1935, *Carr 14799.*

Ficus ochrochlora Ridl. in Trans. Linn. Soc. Lond. Ser. 2, Bot. **9:** 148 (1916).

PAPUA: Western Division, Palmer River, 2 miles below junction of Black River, 100 m. alt., tree 10 m., fruit green, June 1936, *Brass 6954;* same locality, common in second-growth forests on sandy river banks, tree 5 m., receptacles green with brown tubercles, solitary and sessile in axils, about 2.3 cm. diam., July 1936, *Brass 7287;* Central Division, Mafulu, 1250 m. alt., abundant on banks of small stream, tree up to 6–7 m. with spreading branches, receptacles reddish-brown, slightly

warted, about 1.5 cm. diam., September–November 1933, *Brass 5337;* Brown River, 90 m. alt., on bank, tree 6 m., receptacles green, August 1935, *Carr 12946.*

Obviously closely allied to *F. Gazellae* Engl. but with much larger sessile receptacles with numerous scattered bracts.

Ficus macrorrhyncha Lauterb. & K. Schum. in Fl. Deutsch. Schutzgeb. Südsee 277 (1901).

PAPUA: Central Division, Mafulu, 1100 m. alt., tall forest of lower levels, substage tree 10 m., immature receptacles reddish, about 1 cm. diam., September–November 1933, *Brass 5376;* Isuarava, 1350 m. alt., forest, tree 4 m., receptacles dull pink, February 1936, *Carr 15529.*

TERRITORY OF NEW GUINEA: Kani Mts., 1000 m. alt., in woods, January 1908, *Schlechter 17225.*

In my opinion Diels is quite wrong in reducing this species to *F. celebica* Bl., which has leaves with different venation, base and indumentum, and smaller and differently shaped receptacles. The Schlechter specimen is cited by Diels under *F. Caroli* Diels but appears to be an almost glabrous form of *F. macrorrhyncha.*

Ficus trachypison K. Schum. in Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 280 (1901).

Ficus pteleiphylla S. Moore in Jour. Bot. **61,** suppl. 49 (1923).

PAPUA: Western Division, Wuroi, Oriomo River, 5 m. alt., in riverbank forest, loosely branched, erect tree, 10 m. high, receptacles orange-red, about 1.2 cm. diam., January 1934, *Brass 5771;* same locality, 5–10 m. alt., rain forest fringing river, slender tree 15 m., sap not milky, leaves dark and shining above, receptacles pale yellow, about 1.4 cm. diam., January 1934, *Brass 5881;* Central Division, Koitaki, 450 m. alt., open country, tree 4.5 m., receptacles deep golden-yellow, April 1935, *Carr 12030;* same locality and altitude, open savannah land, shrub 1 m., fruits green, May 1935, *Carr ? 12266;* as last, forest, tree 18 m., receptacles green, tipped darker, July 1935, *Carr 12779;* Boridi, by Hovea River, forest, 1050 m. alt., tree 6 m., receptacles yellow, October 1935, *Carr 14736;* same locality and altitude, secondary forest, 4.5 m., receptacles orange, November 1935, *Carr 14934;* Isuarava, 1050 m. alt., secondary forest, tree 9 m., receptacles greenish-orange, February 1936, *Carr 15788.*

The type of *F. pteleiphylla* S. Moore agrees well with *F. trachypison* in vegetative and floral characters, the most obvious difference being that the leaf-venation is much more distinct on the under surface. Judging from other specimens this is merely a matter of preservation.

Ficus hystricicarpa Warb. in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee 244 (1905).

PAPUA: Central Division, Mt. Tafa, 2400 m. alt., brushy roadside clearing, a few examples, small erect branched or unbranched shrub to 50 cm. high, receptacles dark green, orifice red, September 1933, *Brass 5041;* Boridi, 1500 m. alt., forest, shrub 2.5 m., receptacles on very short lateral branches, green, September 1935, *Carr 13335;* Lala River, 1650 m. alt., forest, shrub 3 m., receptacles bright red, December 1935, *Carr 14051;* Eastern Division, Ebomi Island, Samarai, sea level, tree 9 m., November 1933, *Cheesman 132.*

Ficus Caroli Diels in Engl. Bot. Jahrb. **67**: 200 (1935).

PAPUA: Central Division, Mt. Tafa, 2400 m. alt., in landslip shrubbery, common, bush 1.2–1.5 m., young leaves brown beneath, mature stiff, scabrid, receptacles solitary, hard, pale brown, 1.3–1.5 cm. diam., May–September 1933, *Brass 5098;* Boridi, 1410 m. alt., secondary forest, tree 4.5 m., receptacles dark red, September 1935, *Carr 13304;* Alola, 1860 m. alt., forest, tree 9 m., receptacles on very short lateral branches, deep red when mature, December 1935, *Carr 13656* (? 15656); Boridi, 1350 m. alt., forest, tree 4.5 m., receptacles green, September 1935, *Carr 14211;* Boridi, 1200 m. alt., forest, tree 9 m., receptacles pale greenish, October 1935, *Carr 14342;* Boridi, 1410 m. alt., secondary forest, shrub 2 m., receptacles deep blackish-purple, November 1935, *Carr 14866.*

Ficus phaeosyce Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Südsee 276 (1901).

PAPUA: Central Division, Mafulu, 1500 m. alt., forest, tree 6 m., Dec. 1933, *Cheesman 130.*

Ficus Branderhorstii Diels in Engl. Bot. Jahrb. **67**: 201 (1935).

PAPUA: Western Division, Upper Wassi Kussa River, left branch, scattered along gullies in savannah forest, low tree 3–4 m., fruit immature, January 1937, *Brass 8655.*

This specimen is less hairy than the type and the leaves have fewer lateral nerves but the general facies is the same and the two agree in floral characters.

Ficus Armiti King in Jour. Asiat. Soc. Bengal, **55**[2]: 404 (1887).

PAPUA: Central Division, Mafulu, 1250 m. alt., in Oak forests, scandent with slender branches spreading flatly from supporting tree trunk, leaves pale, receptacles solitary, smooth, yellow or orange-yellow, September–November 1933, *Brass 5293.*

Ficus hololampra Diels, l.c. 201.

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, rain forest, common on riverbanks, large independent canopy-tree, stem spur-buttressed, bark brownish-black, rough, fruit depressed-globose, orange-yellow flecked with green, October 1936, *Brass 8079*.

Ficus chaetophora Warb. in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee 246 (1905).

Ficus adenosperma Summerh. in Jour. Arnold Arb. **10**: 143, 206 (1926), non Miq.

PAPUA: Western Division, Palmer River, 2 miles below junction of Black River, 100 m. alt., chief component of seral forests of sandy river-banks and islands of stream, tree 8–10 m. with slightly drooping branches, receptacles soft, green, ± 1.7 cm. diam., June 1936, *Brass 6953;* Lower Fly River, Sturt Island, rain forest, spreading tree 8–10 m., in small pure stands on river bank, latex yellow-brown, leaf-nerves white, fruit green, up to 1.2 cm. diam., October 1936, *Brass 8192;* Central Division, Mafulu, 580 m. alt., common along river bottom, tree 15–18 m. with flat spreading branches, leaves pale, nerves whitish, receptacles green, about 1.5 cm. diam., October 1933, *Brass 5269;* Veiya, sea level, riverside swamp forest, tree 4.5 m., receptacles green, March 1935, *Carr 11598;* same locality, secondary forest, tree 4.5 m., receptacles brown-purple with greenish spots, March 1935, *Carr 11737;* Rouna, 240 m. alt., open savannah land, tree 4.5 m., receptacles green, June 1935, *Carr 12483;* Brown River, 90 m. alt., river bank, tree 4.5 m., receptacles green, August 1935, *Carr 12945*.

TERRITORY OF NEW GUINEA: New Britain, Malabungi Mission, in secondary jungle, *New Guinea Dept. Agric. A 18*.

Ficus adenosperma Miq., to which I referred some specimens of this species collected by Brass in 1926, differs from *F. chaetophora* in the different indumentum of the stems, in the midribs of the leaves being adpressed-hairy beneath and in minor floral details. The species are evidently closely allied.

Ficus pycnoneura Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Südsee 275 (1901); Diels in Engl. Bot. Jahrb. **67**: 187 (1935).

PAPUA: Central Division, Koitaki, 450 m. alt., wood by stream, shrub 2 m., leaves green, nerves rose-red beneath, receptacles shiny green, April 1935, *Carr 11951*.

Diels places *F. pycnoneura* and his new species *F. trichocerasa,* together with *F. aruensis* King, in sect. *Urostigma* where they constitute

one of his four subgroups. Except that *F. pycnoneura* was originally referred to this section, I cannot see on what grounds these species should be included in it, especially as Diels himself says that *F. pycnoneura* is allied to *F. adenosperma* Miq. *Ficus aruensis* appears to me to have nothing to do with the other species and is referred to quite a different section (*Neomorphe*) by King. I have examined material of both the New Guinea species, including the type specimens, and I can find only male and gall flowers in any of the receptacles examined. I have observed no female flowers and indeed all the stigmas seen are of a reduced type found generally in gall flowers. Apart from this, the floral characters are not those of sect. *Urostigma* but rather those of sect. *Sycidium,* to which I believe both species, as well as *F. endochaete* (see below), should be referred. *Ficus xanthoxyla* Summerhayes which, following suggestions made by myself, is placed by Diels in sect. *Eusyce,* is evidently allied to *F. pycnoneura* and should also be included in sect. *Sycidium.*

Ficus endochaete Summerhayes, sp. nov.; affinis *F. pycnoneurae* Lauterb. & K. Schum. et *F. trichocerasae* Diels, a quibus ramulis junioribus ± patentim molliter pilosis, foliis anguste lanceolatis basi subrotundatis subtus costa et nervis densius indutis, receptaculis bracteis prope apicem pseudo-annulatim dispositis mespili ad instar facile distinguenda.

Arbor parva. Ramuli graciles, juniores dense ± patentim molliter griseo-pilosi, demum glabrescentes, cortice rubro-brunneo vel griseo-brunneo leviter ruguloso obtecti. Folia breviter petiolata, anguste lanceolata, apice sensim acuminata, basi rotundata vel subrotundata, usque ad 11 cm. longa et 2 cm. lata, marginibus leviter recurvatis, costa et nervis supra impressis subtus prominentibus, nervis primariis utrinsecus 11–15 infimis e costa angulo fere recto superioribus e costa angulo 50°–60° exortis curvatim adscendentibus prope marginem arcuatim conjunctis, siccitate discoloria, supra juventute adpresse pilosa demum (costa longiuscule adpresseque pilosa excepta) glabra, subtus pallidiora costa et nervis dense adpresseque pilosa ceterum pubescentia; petiolus fere teres, supra leviter canaliculatus, 8–12 mm. longus, ± dense molliter pilosus; stipulae lanceolatae, acuminatae, circiter 1 cm. longae, costa dorsaliter fulvido-pilosa excepta glabrae. Receptacula axillaria, solitaria, pedunculata, sphaeroidea, 8–9 mm. longa, 9–10 mm. diametro, extra breviter pubescentia, intus inter flores dense brunneo-setulosa, bracteis 1–2 infimis basi receptaculi sitis ceteris prope apicem receptaculi pseudo-annulatim dispositis subcarnosis obtusis, ostiolo vix dis-

tincto bracteis leviter prominentibus; pedunculus ebracteatus, gracilis, 7–13 mm. longus, sparse pubescens. Flores masculi cum femineis cecidiophoris in eodem receptaculo inclusi, prope ostiolum dispositi, sessiles; perianthii segmenta 3, distincta, oblonga vel oblanceolata, obtusa, circiter 2 mm. longa, glabra, rubro-brunnea, stamen singulum includentia. Flores feminei cecidiophori sessiles; perianthii segmenta 2–4, iis florum masculorum similia sed lineari-oblonga vel linearia; ovarium ovoideum vel ellipsoideum, stylo laterali vel subapicali stigmate truncato-clavato coronato. Flores feminei non visi.

PAPUA: Central Division, Mt. Tafa, 2400 m. alt., small tree on bank of a stream in forest, leaves pale, receptacles solitary, green, May–September 1933, *Brass 4913*.

From the vegetative and floral characters this species is evidently allied to *F. pycnoneura* Lauterb. & K. Schum. and *F. trichocerasa* Diels, from which it differs most obviously in the very narrow lanceolate leaves, these being elliptical, obovate or broadly oblanceolate in its two relatives. *Ficus trichocerasa* has a number of bracts scattered on the surface of the receptacle, but in *F. endochaete* these are mostly aggregated around the ostiole forming a sort of discontinuous rim and producing an appearance reminiscent of a medlar.

Ficus charadrophila Summerh. in Jour. Arnold Arb. **10:** 152 (1929).

PAPUA: Western Division, Palmer River, 1 mile below junction of Black River, shrub or small tree seldom more than 1 m. high, crown flat, 3–4 m. diam., branches very tough, smooth, purple-black, June 1936, *Brass 6949*.

Ficus Bismarckiana Diels in Engl. Bot. Jahrb. **67:** 206 (1935).

PAPUA: Central Division, Koitaki, 450 m. alt., wood by stream, tree 6 m., receptacles green, tipped dark green, June 1935, *Carr 12582;* Isuarava, 1200 m. alt., secondary forest, tree 9 m., receptacles brownish-olive, February 1936, *Carr 15609*.

TERRITORY OF NEW GUINEA: Admiralty Islands, March 1875, *Moseley*.

Ficus xanthosyce Summerh. in Jour. Arnold Arb. **10:** 144 (1929).

PAPUA: Central Division, Mafulu, 1250 m. alt., forest second growths, common compact tree of erect branching habit, about 5 m. high, ripe receptacles purple, soft and palatable, September–November 1933, *Brass 5243*.

Ficus duriuscula King in Ann. Bot. Gard. Calc. **1:** 155, t. 195 (1888).

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt

Island, rain forest, common on ground occasionally flooded, substage tree 14–16 m., fruit hard, in numerous small fascicles on stem, yellow brown, erect, October 1936, *Brass 8001;* Central Division, Rona, Laloki River, 450 m. alt., common in shelter of rocks on savannah hillside, tree 3–4 m., receptacles occasionally axillary but almost all fasciculate on trunk and branches, 1.5 × 1.3 cm., red, soft when ripe, March 1933, *Brass 3567;* same locality and altitude, light rain forest on hillside, small tree 5 m. high, leaves shining above, receptacles in fascicles on stem and main branches, broadly pyriform, about 2.5 cm. diam., reddish brown with pale yellow dots, March 1933, *Brass 3619;* near Rouna Falls, 270 m. alt., forest on steep rocky hillside, tree 4.5 m., receptacles on short branches, deep cream suffused rose-red at apex, May 1935, *Carr 12358;* North-Eastern Division, Kokoda, 360 m. alt., forest, small tree, September 1933, *Cheesman 91.*

Ficus muriculata Miq. in Zoll. Syst. Verz. 93, 98 (1854).

Ficus longepedunculata Rechinger; Diels in Engl. Bot. Jahrb. **67**: 208 (1935), non Elmer.

PAPUA: Western Division, Tarara, Wassi Kussa River, in village clearing, one tree 6 m. high, midrib and nerves red below, fruit clustered on main branches, brown, depressed, secreting a thick yellow latex, January 1937, *Brass 8749;* Central Division, Veiya, sea-level, forest, tree 12 m., receptacles on very short cauline branches or axillary, very pale green, March 1935, *Carr 11728;* North-Eastern Division, Kokoda, 360 m. alt., forest, April 1933, *Cheesman 2,* May 1933, *Cheesman 22.*

I am not quite certain of the relationship of this to *F. copiosa* Steud. which is very similar in many respects.

Sect. COVELLIA

Ficus septica Burm. f. Fl. Ind. 226 (1768); Diels in Engl. Bot. Jahrb. **67**: 194 (1935).

Ficus casearia F. Muell. ex Benth.; Summerh. in Jour. Arnold Arb. **10**: 148 (1929).

PAPUA: Western Division, Daru Island, plentiful in low secondary growth on old garden clearings, shrub or small tree, fruit white, March 1936, *Brass 6243;* Lake Daviumbu, Middle Fly River, rain forest, shrub in forest borders or tree 5–6 m. in secondary growth, fruit white, August 1936, *Brass 7558;* Central Division, Rona, Laloki River, 450 m. alt., in shelter of rocks on savannah, tree 3–4 m., no latex, receptacles greenish white, ribbed, up to 2.5 cm. diam., March 1933, *Brass*

3569; Mafulu, 1250 m. alt., plentiful in regrowth brush, bush or small tree 2–3 m., receptacles in axillary pairs, pale green, September–November 1933, *Brass 5412;* Mafulu, 1200 m. alt., on grass slope in forest, young trees 2 m. high, Dec. 1933, *Cheesman 131;* Kanosia, 15 m. alt., under *Hevea,* tree 4.5 m., receptacles axillary, pale green, February 1935, *Carr 11530;* Boridi, 1110 m. alt., secondary forest, tree 5 m., receptacles green, spotted brown, October 1935, *Carr 14661;* Isuarava, 1050 m. alt., secondary forest, tree 7.5 m., receptacles light green, February 1936, *Carr 15746.*

Territory of New Guinea: Minjem Thor, May 1907, *Schlechter 16091* (cited by Diels under *F. tinctoria* Forst. f.); Morobe Distr., Andarova, 1500 m. alt., forest on mountain side, small tree, January 1937, *Blackwood 176;* Duke of York Island (between New Britain & New Ireland), *Bradtke 274;* New Britain, Möwehafen, sea-level, tropical rain forest, June 1937, *Blackwood 314* — vern. name, "Watiri."

I do not understand on what grounds Diels transferred this species from sect. *Covellia* (in which it was placed by King under the name of *F. leucantotoma* Poir.) to sect. *Sycidium.* King's plate shows the gall and female flowers to possess the typical structure of sect. *Covellia,* while specimens from New Guinea possess identical floral structure. It is interesting to note that although all the specimens I have seen from Malaya and the mainland of New Guinea possess strictly axillary receptacles, there are some in the Kew Herbarium from the Admiralty Islands and from the New Hebrides in which some of the receptacles are borne on leafless cauline branches such as are found generally in sect. *Covellia.* In other respects these specimens agree perfectly with material bearing axillary receptacles.

Ficus formosa Summerhayes, sp. nov.; inter species sectionis foliis obovatis inferne subvelutinis, receptaculis axillaribus solitariis, florum cecidiophororum perianthii segmentis liberis apice subspathulatis subulato-acuminatis valde distincta.

Arbor formosa, multiramosa, 16 m. alta; ramuli crassiusculi, longitudinaliter rugulosi, juventute molliter villosuli, demum glabri cortice cinereo-brunneo obtecti, cicatricibus stipularum et foliorum delapsorum notati. Folia breviter petiolata, obovata, apice breviter caudato-acuminata, inferne cuneatim angustata, basi ipsa aequaliter subcordata, 9–14 cm. longa, 5–8 cm. lata, viva pallida, siccitate brunnescentia, supra costa pubescente excepta glabra, subnitentia, subtus praesertim costa et nervis subvelutino-villosula, costa et nervis supra impressis subtus prominentibus, nervis lateralibus utrinsecus 9–13 e costa angulo 65°–85°

exortis parallelis curvatis juxta marginem arcuatim conjunctis, nervis secundariis et tertiariis distinctis, mesophyllo subtus sub lente minute elevato-puncticulato; petiolus 1–2 cm. longus, supra canaliculatus, villosulus; stipulae 1–2 cm. longae, extra villosulae. Receptacula axillaria, solitaria, breviter pedunculata, valde depresse globosa, usque ad 3 cm. longa et 4 cm. diametro, extra sparse pubescentia, intus inter flores hyalino-setosa, pedunculo circiter 5 mm. longo quam receptaculo magis piloso apice bracteis tribus brevissimis truncatis instructo, ostiolo vix prominente bracteis numerosis imbricatis levissime adscendentibus instructo. Flores masculi prope ostiolum siti, sessiles; perianthii segmenta 3–4, libera vel basi ± connata, lanceolato-ligulata, acuta, 3–3.5 mm. longa, stamen superantia, glabra, rubro-brunnea; stamen 1, anthera apiculata 1.5 mm. longa. Flores feminei cecidiophori sessiles vel usque ad 2 mm. pedicellati; perianthii segmenta 5, libera, ex ungue longa angustissima subspathulata, apice subulato-acuminata, tota 3–5.5 mm. longa; ovarium stipitatum, stipite usque ad 3.5 mm. longo, ellipsoideum vel obovoideum, 1–2 mm. longum, atro-brunneum, stylo infra-apicali, stigmate breviter infundibuliformi. Flores feminei non visi.

PAPUA: Central Division, Mafulu, 1250 m. alt., in lower primary forest, much branched tree, 16 m. high, leaves pale, receptacles solitary in axils, up to 4 × 3 cm., September–November 1933, *Brass 5346*.

This species shows such an exceptional combination of characters that it is difficult to place it with confidence in any of the sections proposed by King. In general appearance of the vegetative parts and receptacles it resembles those species of sect. *Covellia* with axillary receptacles, while the infundibuliform stigmas of the gall-flowers are quite similar to those in many species of this section. The perianths of both male and gall flowers are, however, very unlike those usually found in sect. *Covellia,* consisting of several almost or quite free parts, and being much more reminiscent of the perianth in many species of sect. *Sycidium*. In the gall flowers each segment has a long narrow claw with a spathulate lamina at the apex. Corner* points out that in *F. cunia* Ham. the perianth segments in the female flowers are only united at the base. This species, however, has geocarpic receptacles and is in other respects very dissimilar from *F. formosa*.

Ficus hylophila Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Südsee 283 (1901).

PAPUA: Western Division, Oriomo River, Wuroi, 10 m. alt., solitary example at river landing place clearing, apparently planted, small bushy

*Jour. Roy. Asiat. Soc. Malay. Branch 11: 21 (1933).

tree 4 m. high, receptacles yellow-green, sweet and palatable, January–March 1934, *Brass 5792;* Central Division, Dieni, Ononge Road, 500 m. alt., common in rain forests, slender tree 5 m., leaves dark and glossy, receptacles clustered on trunk, 1 cm. long, 1.2 cm. diam., florets purple, April 1933, *Brass 3828;* Mafulu, 1250 m. alt., common in lower forests, tree 5–8 m., leaf midrib and nerves whitish, receptacles clustered on lower trunk, numerous, pyriform, November 1933, *Brass 5506.*

Ficus Hahliana Diels in Engl. Bot. Jahrb. **67**: 211 (1935).

PAPUA: Western Division, Fly River, 528 mile camp, 80 m. alt., rain forest secondary growth, slender, sparsely branched tree 6 m. high, fruit costate at apex, in small clusters on stem below branches, May 1936, *Brass 6755.*

This agrees with Diels' description in the indumentum, shape and size of the leaves, the number of lateral nerves, the type of inflorescence, the setose inside of the receptacle and the hairy styles. It differs in the shape of the base and the hairy upper surface of the leaves, the length of the peduncles and the slightly smaller female flowers.

Ficus Bernaysii King in Jour. Asiat. Soc. Bengal **55**[2]: 406 (1887).

PAPUA: Central Division, Isuarava, 1350 m. alt., secondary forest, tree 6 m., receptacles on short, very dense lateral branches, brown, February 1936, *Carr 15517.*

Ficus grandis King in Ann. Bot. Gard. Calcutta **1**: 170, t. 214 (1888).

PAPUA: Central Division, Rona, Laloki River, 450 m. alt., rare in shelter of rocks on open savannah, stiffly branched small tree 4 m. high with very slightly fissured bark, leaves stiff, white-flecked on upper surface, receptacles clustered on trunks and along branches, depressed pyriform, 3.5 cm. long, 4–5 cm. diam., yellow-green with white flecks and small brown pointed tubercles, rather palatable, March 1933, *Brass 3551;* Kanosia, sea level, in marshy forest, tree 4.5 m., receptacles on very short cauline branches, February 1935, *Carr 11316;* Koitaki, 450 m. alt., in wood by stream, tree 6 m., receptacles in short branched cauline inflorescences, cream, suffused dull red towards the base, April 1935, *Carr 11949.*

Ficus setistyla Warb. in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee 248 (1905).

Ficus grandis Diels in Engl. Bot. Jahrb. **67**: 214 (1935), partim.

PAPUA: Western Division, Dagwa, Oriomo River, 40 m. alt., forest patches in limestone sink-hole, small tree, branchlets hollow, receptacles

in small clusters on trunk and main branches, soft, warty, February 1934, *Brass 5967;* Daru Island, at edge of rain forest, spreading low tree 6 m. high, fruit in numerous fascicles on trunk and main branches, flattened, yellow-green, April 1936, *Brass 6440;* Lake Daviumbu, Middle Fly River, occasional in secondary rain forest, low cauliflorus tree, 4.5 m., fruit green, warted compressed, about 4 cm. diam., September 1936, *Brass 7740;* Central Division, Kubuna, 100 m. alt., riverbank in rain forest regrowths, tree 6 m., branches hollow, receptacles in small clusters on trunk, up to 5 cm. diam., green, November 1933, *Brass 5605;* Veiya, sea level, riverside forest, tree 12 m., receptacles in very short dense cauline branches, olive-green laxly speckled brown, eaten by natives, March 1935, *Carr 11640* — vern. name, "Nananu."

In his account of the New Guinea figs Diels includes this under *F. grandis* King. Examination of material of both species satisfies me that they should be separated as distinct species. *Ficus setistyla* differs in the leaves being much hairier, in the base being usually markedly cordate with often unequal sides and in the much shorter petiole. The stigmas of the gall flowers are peltate whereas those of *F. grandis* are infundibuliform.

Ficus pachythyrsa Diels in Engl. Bot. Jahrb. **67**: 215 (1935).

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, rain forest, substage tree on drier soils, receptacles crowded at ends of thick spreading branches up to 50 cm. long on lower stem, green speckled with brown, about 2 cm. diam., October 1936, *Brass 8144.*

This specimen agrees well with Diels' description except the hairs on the leaf nerves are not closely but only loosely adpressed.

Ficus arfakensis King in Ann. Bot. Gard. Calcutta, **1**: 104, t. 133 (1888).

PAPUA: Central Division, Dieni, Ononge Road, 500 m. alt., rain forest, slender tree 10 m., fruiting branches on lower trunk, up to 1 m. long, receptacles pale brown, 1.4 cm. long, 1.6 cm. diam., April 1933, *Brass 3832;* Mafulu, 1250 m. alt., substage of forest on limestone country, tree 7–8 m., leaves thin, brown hirsute beneath, fruiting branches near base of trunk, 1.5 m. long, half their length resting on the ground, October 1933, *Brass 5227;* Koitaki, 450 m. alt., forest, tree nearly 4 m., receptacles on cauline branches, brown, April 1935, *Carr 12025;* Garabinumu, 300 m. alt., forest, tree 6 m., receptacles on basal branches up to 3 m. long, green spotted biscuit, August 1935, *Carr 12910;* Yodda River below Isuarava, 1050 m. alt., secondary forest,

tree 6 m., receptacles on long lateral branches, red-brown speckled cream, February 1936, *Carr 15489*.

Ficus myriocarpa Miq. Ann. Mus. Lugd.-Bat. **3**: 230 (1867).

Papua: Western Division, Palmer River, 2 miles below junction of Black River, 100 m. alt., common in older second growth forests on river flood-plains, tree 10–12 m., receptacles on diffuse leafless branches from trunks and main limbs, soft, red, 1.5 cm. diam., July 1936, *Brass 7328;* Central Division, Bella Vista, 1450 m. alt., common in regrowth forest, densely foliaged spreading tree about 12 m. high, immature receptacles on long pendent panicles, November 1933, *Brass 5441;* Koitaki, 450 m. alt., forest, tree 15 m., receptacles on basal branches nearly 2 m. long, orange-red, July 1935, *Carr 12807;* Brown River, 90 m. alt., river bank, tree 4.5 m., geocarpic, receptacles on long basal branches, dull red, August 1935, *Carr 12950;* Boridi, 1110 m. alt., forest, tree 9 m., receptacles on long lateral branches sometimes trailing along the ground, dull red, October 1935, *Carr 14664*.

Territory of New Guinea: Morobe Distr., above Eku, 1500 m. alt., forest on mountain side, tree, fruit branches hang straight from trunk, *Blackwood 224*. Vern. Names: — wikwa (Nauti), gwaip (Mauki).

Ficus conora King in Ann. Bot. Gard. Calcutta, **1**: 103, t. 131 (1888).

Ficus brachiata Ridley in Gibbs, Phytogeogr. & Fl. Arfak Mts. 208 (1917), non King.

Netherlands New Guinea: Manokoeari, 60–150 m. alt., common in high forests, January 1914, *Gibbs 6172*.

Papua: Central Division, Koitaki, 450 m. alt., wood by stream, tree 6 m., receptacles on cauline branches, green with whitish spots and brown warts, April 1935, *Carr 11954;* near Rouna Falls, 270 m. alt., forest on steep rocky hillside, tree 6 m., receptacles on long branches, green, tipped darker and spotted brown, May 1935, *Carr 12365;* Boridi, 1050 m. alt., forest, tree 7.5 m., receptacles on lateral branches, green, spotted brown, October 1935, *Carr 14654;* North-Eastern Division, Kokoda, 360 m. alt., near stream in forest, slender tree 4.5 m. high, fruit in loose bunches from the trunk on long twigs of unequal length, May 1933, *Cheesman 30*.

Sect. Neomorphe

Ficus nodosa Teysm. & Binn. in Nat. Tijdsk. Nederl. Ind. **29**: 245 (1866).

Papua: Western Division, Lower Fly River, east bank opposite Sturt Island, rain forest, cauliflorous tree on river bank, stem plank-

buttressed, bark thin, reddish brown, fruit in paniculate clusters, about 3.5 cm. diam., smooth, reddish-brown spotted with green, October 1936, *Brass 8047;* Central Division, Veiya, sea-level, forest, tree 21 m., receptacles on short cauline branches, dull red spotted pale brown, March 1935, *Carr 11693.*

TERRITORY OF NEW GUINEA: New Britain, Möwehafen, tropical forest, fruit in small bunches from trunk, July 1937, *Blackwood 342* — Vern. Name, "taganum."

Ficus variegata Bl. Bijdr. 459 (1825).

PAPUA: Western Division, Lower Fly River, east bank opposite Sturt Island, rain forest of moister ridges, large canopy tree, stem spur-buttressed, bark grey-brown, fruit clustered on larger branches, few on stem, about 3 cm. diam., smooth, green flecked with white, October 1936, *Brass 8223;* Central Division, Veiya, sea level, forest, tree 24 m., receptacles on short cauline branches, green, March 1935, *Carr 11721.*

TERRITORY OF NEW GUINEA: New Britain, Möwehafen, sea level, tropical forest, tree, July 1937, *Blackwood 340* — Vern. Name, "malaya."

Sect. EUSYCE

Ficus distichoidea Diels in Engl. Bot. Jahrb. **67**: 221 (1935).

PAPUA: Central Division, Koitaki, 450 m. alt., in forest on an *Artocarpus,* climber, receptacles axillary, orange, May 1935, *Carr 12112.*

Ficus calodictya Summerh. in Jour. Arnold Arb. **10**: 149 (1929).

PAPUA: Central Division, Brown River, at Emia creek, 90 m. alt., climber, receptacles axillary, green, August 1935, *Carr 12925.*

Ficus Pantoniana King in Jour. Asiat. Soc. Bengal, **55**[2]: 407 (1887).

PAPUA: Central Division, Koitaki, 450 m. alt., climber on an *Artocarpus* in forest, receptacles axillary, orange-red turning purple when ripe, May 1935, *Carr 12113.*

Ficus cinnabarina S. Moore in Jour. Bot. **61**: suppl. 50 (1923).

PAPUA: Western Division, Palmer River, 2 miles below junction of Black River, 100 m. alt., very large root climber of forest canopy, fruit solitary or in pairs, axillary or in lateral fascicles of 2–4, depressed-globose, 3 cm. long, 3.5 cm. diam., red when ripe, soft, fleshy, covered with irritant hairs, July 1936, *Brass 7214;* Lake Daviumbu, Middle Fly River, stiff climber of rain forest canopy, fruit covered with brown irritant hairs, August 1936, *Brass 7463;* Lower Fly River, east bank opposite Sturt Island, common on ridges in rain forest, large root-climber, fruit about 3 cm. diam., green, covered with irritant brown

hairs, florets purple, October 1936, *Brass 8098;* Central Division, Koitaki, 450 m. alt., forest, climber, receptacles axillary, deep rose-red, June 1935, *Carr 12523.*

Ficus Baeuerleni King in Jour. Asiat. Soc. Bengal 55[2]: 408 (1887).

PAPUA: Central Division, Koitaki, 450 m., stream bank in open country, climber, receptacles axillary, green, April 1935, *Carr 11960;* same locality and altitude, wood by stream, climber, receptacles axillary, rose-red, June 1935, *Carr 12591.*

Ficus fuscata Summerhayes, sp. nov.; a *F. obtusa* Hassk. foliis majoribus acutioribus basi leviter rotundatis tantum supra haud scaberulis costa et nervis subtus villosulis nec velutino-pubescentibus, receptaculis longius pedunculatis intus inter flores fere glabris distinguitur.

Scandens; ramuli siccitate longitudinaliter rugulosi, juventute dense fulvo-villosi, demum glabri, cortice pallide cinereo-brunneo obtecti, cicatricibus fere orbicularibus prominentibus foliorum delapsorum notati. Folia alterna, petiolata; lamina ovata vel elliptico-ovata, apice breviter acuminata, basi leviter rotundata, 9–17 cm. longa, 4–12 cm. lata, firme chartacea vel fere subcoriacea, basi trinervis, costa (ut nervi) supra impressa subtus prominente, nervis lateralibus utrinsecus 6–8 e costa angulo 30°–45° exortis prope marginem arcuatis inter se indistincte conjunctis prominentibus, nervis secundariis venis venulisque reticulationem crebrem distinctam efformantibus, supra laevis, in statu vivo nitens, praeter costam et nervos inferne villosulos glabra, subtus costa et nervis villosulis exceptis pubescens; petiolus 1.5–3.5 cm. longus, dorsaliter leviter compressus, fulvo-villosulus deinde glabrescens, laevis, brunneus; stipulae dense fulvo-villosulae, 6–8 mm. longae. Receptacula axillaria, gemina, pedunculata, feminea tantum visa, leviter depresse globosa, circiter 2 cm. longa et diametro, immatura pallide rubra, matura atro-purpurea, extra fulvide pubescentia, demum glabrescentia, intus inter flores fere glabra, bracteis basalibus basi receptaculi sitis annulatim conjunctis, ostiolo prominente fulvide villosulo-pubescente bracteis ciliatis; pedunculus circiter 6 mm. longus, setuloso-pubescens et sparse villosulus. Flores feminei saepissime sessiles; perianthii segmenta 3, anguste lanceolata, inter se adhaerentia, usque ad 4.5 mm. longa, ovarium includentia, glabra, rubro-brunnea; ovarium compresse oblongo-ellipsoideum vel sursum sensim angustatum, breviter stipitatum, 2.5 mm. longum, stylo subapicali gracili hyalino, stigmate brunnescente ± clavato cum aliis connato discum ± orbicularem efformantibus. Achaenia immatura late alata, laevia, brunneo-aurantiaca.

PAPUA: Central Division, Dieni, Ononge Road, 500 m. alt., climber in rain forest, upper side of leaves shining, receptacles depressed-globose, 2.2 cm. long, 1.8 cm. diam., pink becoming dark purple when ripe, May 1933, *Brass 3929*.

Not very closely allied to any New Guinea species known to me, but resembling *F. obtusa* Hassk. in general features and particularly in the receptacles and floral structure. *Ficus obtusa*, however, has the interior of the receptacle densely setose between the flowers whereas in *F. fuscata* it is almost glabrous. Both species are known only from the female receptacles. The perianth in both cases is more that of sect. *Sycidium* than of sect. *Eusyce*, but until the male plants are known no decision can profitably be made on this point.

Ficus trichosphaeridia Diels in Engl. Bot. Jahrb. **67**: 225 (1935).

PAPUA: Central Division, Koitaki, 450 m. alt., forest, climber, receptacles axillary, brownish-olive with small red warts, June 1935, *Carr 12622*.

Ficus irritans Summerhayes, sp. nov.; affinis *F. trichosphaeridiae* Schltr., a qua habitu erecto nec scandente, foliis duplo minoribus basi leviter rotundatis nec cordatis subtus sparsiuscule adpresse pilosis, receptaculis brevissime pedunculatis paulo majoribus differt.

Arbor parva; rami novelli densiuscule adpresse pilosi, demum glabrescentes cortice rubro-brunneo longitudinaliter striato obtecti. Folia petiolata; lamina anguste lanceolato-elliptica vel elliptico-lanceolata, apice breviter acuminata, basi fere vel leviter rotundata, 5–11 cm. longa, 2.5–4 cm. lata, costa et nervis supra impressis subtus prominentibus, nervis lateralibus utrinsecus 4–6 e costa 30°–45° exortis curvatim adscendentibus prope marginem indistincte conjunctis, venis secundariis tertiariis et ultimis distinctis, supra juventute sparsissime adpresse pilosa demum glabra, subtus praesertim costa et nervis adpresse molliter pilosa; petiolus 8–12 mm. longus, teres, supra anguste canaliculatus, subdense adpresse pilosus; stipulae gemmarum lanceolatae, acuminatae, fulvide adpresse pilosae, 1–1.5 cm. longae. Receptacula axillaria, solitaria, brevissime pedunculata, depresso-globosa, matura fusco-rubra, 1.6–1.8 cm. diametro, extra pilis fulvidis irritantibus dense induta, intus inter flores sparse pubescentia, ostiolo leviter producto bracteis vix distinctis; pedunculus 2–3 mm. longus, ebracteatus. Flores masculi et feminei cecidiophori non visi. Flores feminei sessiles vel usque ad 2 mm. pedicellati; perianthii segmenta 3–4, oblanceolata, obtusa, basi angustissima, usque ad 2.5 mm. longa, glabra, rubro-brunnea; pedicellus sparsissime pubescens; ovarium breviter stipitatum, anguste oblongo-

ellipsoideum, circiter 2 mm. longum, stylo subapicali, stigmate irregulariter clavato cum iis florum aliorum cohaerente.

PAPUA: Central Division, Mafulu, 1250 m. alt., in forest regrowth, small tree, leaves shining above, receptacles soft, dark red when ripe, 1.6–1.8 cm., covered with irritant hairs, September–November 1933, *Brass 5260*.

This species, which appears from vegetative and floral characters to be a typical member of sect. *Eusyce*, is easily recognised by the small narrowly lanceolate-elliptical leaves with adpressed indumentum underneath and the almost sessile receptacles covered densely with irritant hairs, hence the specific epithet. Curiously enough, although an erect tree itself, its closest relatives are climbers, viz, *F. trichosphaeridia* Diels and *F. balanota* Diels. The differences between *F. irritans* and the former are given in the diagnosis; *F. balanota* has longer leaves with rounder base and soft spreading indumentum beneath, while its smaller receptacles have longer stalks, a much shorter indumentum and a remarkable cone-like projection at the apex leading up to the ostiole.

Ficus insculpta Summerhayes, sp. nov.; ex affinitate *F. sageretinae* Diels et *F. propinquae* Merr., ab illa ramis juventute magis pilosis, foliis latioribus siccitate bullato-rugosis, nervis subtus patentim vel fere recurvatim pubescentibus, receptaculis adpresse ferrugineo-pilosis apice latissime coronatis, ab hac foliis minoribus, stipulis vix persistentibus, receptaculis sessilibus praesertim apice adpresse ferrugineo-pilosis differt.

Scandens; caules teretes, juventute molliter et dense ferrugineo-subhirsuti, demum glabrescentes, cortice fusco-brunneo leviter longitudinaliter striolato lenticellis rotundatis minutis asperulo obtecti, radicibus caespitosis tenuibus glabris instructi. Folia ut videtur disticha, breviter petiolata; lamina lanceolato- usque orbiculari-ovata, apice leviter et breviter acuminata, basi aequaliter cordata vel rotundata, usque ad 8 cm. longa et 5 cm. lata, marginibus saepe leviter recurvatis, costa (ut nervis primariis et secundariis) supra impressa (folia supra subbullato-insculpta) subtus prominente, nervis primariis utrinsecus 5–8 e costa angulo 45°–50° exortis adscendentibus juxta marginem arcuatim conjunctis, reticulationibus ultimis subdistinctis, supra glabra vel basi pilis perpaucis instructa, nitens, subtus praesertim costa et nervis molliter patentim pilosa; petiolus crassiusculus, 5–15 mm. longus, teres, supra angustissime canaliculatus, subdense subhirsutus; stipulae dense hirsutae, circiter 1 cm. longae. Receptacula axillaria, solitaria vel gemina, sessilia, ± globosa, 7–10 mm. diametro, extra praesertim superne sparse

adpresseque ferrugineo-hirsuta, bracteis basalibus deltoideis paleaceo-membranaceis adpresse hirsutis deciduis, ostiolo prominente bracteis vix distinctis vel subprominentibus, intus inter flores glabra vel sparsissime setosa. Flores masculi prope ostiolum siti, sessiles vel breviter pedicellati; perianthii segmenta 3–4, libera, oblonga vel spathulato-oblonga, obtusa, circiter 1.5 mm. longa, glabra, rubro-brunnea; stamina 2, filamentis brevibus, antheris 1–1.2 mm. longis. Flores feminei cecidiophori (immaturi) sessiles vel breviter pedicellati; perianthii segmenta iis florum masculorum similia sed breviora; ovarium breviter stipitatum, obovoideo-globosum, stylo subapicali, stigmate vix incrassato 2–3-denticulato. Flores feminei (immaturi) sessiles vel breviter pedicellati, perianthii segmentis 3–4 ferrugineis oblongis usque lanceolatis, ovario vix evoluto stylo hyalino stigmate hyalino clavato.

PAPUA: Central Division, Mafulu, 1250 m. alt., climbing on tree trunks in forest, leaves stiff, glossy above, receptacles immature, September–October 1933, *Brass 5281* (subsidiary type—female plant); Boridi, 1440 m. alt., climber in forest, receptacles axillary, olive-green, September 1935, *Carr 14231* (TYPE—male-gall plant). A species easily recognised by the small very wrinkled and sub-bullate leaves spreading hairy beneath, and sessile receptacles with the ostiole placed at the apex of a broad obtuse but not well-marked crown.

Ficus hypophaea Schltr. ex Diels in Engl. Bot. Jahrb. 67: 226 (1935).

PAPUA: Central Division, Alola, 1800 m. alt., climber in forest, receptacles axillary, red-purple, Jan. 1936, *Carr 14155;* Boridi, 1350 m. alt., climber in forest, leaves brown beneath, receptacles axillary, dark green, November 1935, *Carr 14497.*

Ficus Odoardi King in Ann. Bot. Gard. Calcutta 1: 156, t. 198 (1888).

PAPUA: Central Division, near Rouna Falls, 270 m. alt., forest on steep rocky hillside, climber, receptacles axillary, brown, May 1935, *Carr 12359;* Koitaki, 450 m. alt., climber in forest, receptacles axillary or cauline, deep rose-red with golden hairs, June 1935, *Carr 12696;* Boridi, 1050 m. alt., climber in forest by a river, receptacles axillary, olive tinted red, October 1935, *Carr 14724.*

Ficus microdictya Diels in Engl. Bot. Jahrb. 67: 229 (1935).

PAPUA: Central Division, East Mt. Tafa, 2300 m. alt., foothill forest on sheltered side of range, tree 15 m., leaves dark and shining above, pale beneath, receptacles axillary, solitary, depressed, 1.8 × 2.2 cm., green, May 1933, *Brass 4075;* Mt. Tafa, 2400 m. alt., rare in forests of narrow valleys, large tree, bark fibrous, pale brown, leaves smooth,

dark, midrib whitish, receptacles axillary, solitary, or in small lateral fascicles, 1.2 × 2.5 cm., September 1933, *Brass 4948;* same locality, 2550 m. alt., mossy forest on mountain side, 3 m. high, February 1934, *Cheesman 200.*

Ficus ihuensis Summerh. in Jour. Arnold Arb. **10:** 153 (1929); Diels, l.c. 187.

PAPUA: Central Division, Isuarava, 1440 m. alt., forest, tree 36 m., receptacles axillary, green suffused dull red, rose-red inside, February 1936, *Carr 15426.*

The Carr specimen cited above bears male-gall receptacles and these show that the species belongs to sect. *Eusyce* and not to sect. *Urostigma* as assumed by Diels.

Ficus incompta Diels, l.c. 229.

PAPUA: Central Division, Mafulu, 1250 m. alt., lower primary forest, tree 15 m. with numerous short lateral branches, leaves pale floccose beneath, September–November 1933, *Brass 5326.*

Ficus sp.

PAPUA: Central Division, Mafulu, 1250 m. alt., very common in forests and on roadside banks, scandent and closely adpressed to rocks or tree-trunks, galled receptacles up to 1.5 cm. diam., September–November 1933, *Brass 5348.*

This appears to be the early stage of some climbing species which probably develops very different leaves later on. The receptacles all seem to be abnormal, apparently having been attacked by some insect.

Sect. SYNOECIA

Ficus Scratchleyana King in Jour. Asiat. Soc. Bengal **55**[2]**:** 404 (1887).

PAPUA: Western Division, Palmer River, 2 miles below junction of Black River, 100 m. alt., rain forest of ridges, large root-climber adpressed to trunk and branches of large trees, fruit globose, soft, yellow, about 1 cm. diam., July 1936, *Brass 7173;* Central Division, Dieni, Ononge Road, 500 m. alt., large root-climber massed on trunk of rain forest tree, leaves dark, shiny, immature receptacles depressed-globose, 2 cm. long, 2.3 cm. diam., green with white flecks, April 1933, *Brass 3844.*

Ficus gymnorygma Summerhayes, sp. nov.; affinis *F. Carri* Corner, a qua foliis breviter petiolatis supra nervis vix impressis subtus fulvide subtomentosis foveis stomatiferis nudis, receptaculi ostioli bracteis prominentibus, florum femineorum perianthii segmentis linearifiliformibus hyalinis differt.

Frutex alte scandens; rami saepe simplices, juventute dense ferrugineo-tomentosi, demum glabrescentes, cortice brunneo obtecti. Folia (acrophylla) elliptico-lanceolata vel lanceolato-elliptica, apice breviter acuminata, basi ± rotundata vix vel haud obliqua, 8–16 cm. longa, 4–6.5 cm. lata, marginibus recurvatis, costa supra impressa subtus prominente, nervis primariis utrinsecus 7–9 infimis exceptis e costa angulo recto vel fere recto exortis juxta marginem arcuatim conjunctis subtus prominentibus, nervis secundariis minus distinctis, reticulatione indistincto, inter venas foveis stomatiferis latis sed haud profundis orbicularibus instructa, supra glabra, laevia, subtus praesertim nervis venisque ± dense fulvide subtomentosa, foveis stomatiferis glabris; petiolus subteres, 1.5–2.5 cm. longus, dense ferrugineo-tomentosus; stipulae breviter adpresse pubescentes, 12 mm. longae. Receptacula aurantiaco-flavida, axillaria, solitaria, breviter pedunculata, fere globosa vel ellipsoidea, 2.5–3 cm. longa, 2.3–2.7 cm. diametro, ostioli bracteis valde prominentibus acutis, extra breviter ferrugineo-pilosa, intus inter flores setoso-pilosa; pedunculus circiter 5 mm. longus, breviter ferrugineo-pilosus, basi vel supra basin bracteis tribus deltoideis acuminatis instructus. Flores masculi et feminei cecidiophori non visi; flores feminei verosimiliter sessiles, perianthii segmentis 3–4 lineari-filiformibus usque ad 4 mm. longis hyalinis, ovario ± longe stipitato ellipsoideo vel ± reniformi 2–3 mm. longo ferrugineo, stylo infra-apicali 1–1.5 mm. longo stigmate brevi bifido vel rarius trifido brachiis acutis hyalino. Flores neutri cum femineis commixti et eos aequantes, circiter 3 mm. pedicellati, perianthii segmentis 3 lanceolatis acutis 1.5 mm. longis hyalinis.

PAPUA: Central Division, Bella Vista, 1450 m., in oak forest, root climber with high climbing stems, leaves yellowish, receptacles orange-yellow, Nov. 1933, *Brass 5474*.

The climbing habit, stomata-bearing pits on the lower surface of the leaves and presence of neuter flowers in the seed receptacles indicate that the species should be placed in sect. *Synoecia*. It is, however, much to be regretted that male-gall receptacles were not collected. *Ficus gymnorygma* is the third representative of this section to be recorded from New Guinea, but instead of being allied to *F. Scratchleyana* King and *F. rhopalosycia* Diels, the other Papuan species, it much more closely resembles the Bornean *F. Carri* Corner. From this it differs in many features, the most striking one being that the circular pits on the lower surface of the leaf are glabrous instead of hairy, as in all other species of sect. *Synoecia* having these pits. Another aberrant character is the perianth of the female flowers which is (at all events, in the dried flowers) quite thin and hyaline instead of fleshy and coloured. There

is, however, a little doubt as to the nature of the structures which I have considered as the perianth. They are attached at the very base of the flower and may really be extra long receptacular hairs or perhaps the floral bract and the two bracteoles. If this interpretation is correct there is *no perianth* in the female flowers. The neuter flowers, although typical in general structure, have a thin hyaline perianth.

According to the collector's notes the species is a root-climber but unfortunately no portion bearing roots was collected. Nothing is stated about the presence of more than one type of leaf so that the occurrence of bathyphylls still remains doubtful; the description applies only to what are obviously acrophylls.

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NEW PHANEROGAMS FROM MEXICO, IV*

IVAN M. JOHNSTON

Atriplex Stewartii, sp. nov.

Frutex dioicus 2.5–5 dm. altus pallidus saepe erectus et globosus; caulibus numerosis ascendenter ramosis; foliis numerosis alternis oblongis vel late lanceolatis, majoribus 2–2.5 cm. longis 5–8 mm. latis infra medium vel rariter supra medium latioribus, basi cuneatis subsessilibus, margine integris vel sinuato-dentatis; floribus femineis in axillis foliorum minorum superiorum glomeratis; bracteis fructiferis corpus seminiferum quadrialatum rostro conspicuo terminali donatum formantibus; corpore (alis 1–4 mm. latis exclusis) subsessili 3–6 mm. longo 1.5–2.5 mm. crasso infra medium crassiore; rostro conspicuo 2–5 (–7) mm. longo lobos subaequilongos ligulatos vel cuneatos basim versus 1–1.5 (–2) mm. latos bifido supra alas corporis conspicue projecto; corpore alato a latere viso transverse elliptico vel suborbiculato usque ad ob-reniforme 5–10 mm. lato, basi saepe rotundato, apice rotundo vel truncato vel breviter lateque angulato-lobato, margine integro vel undulato rariter dentato-lobato; seminibus eas *A. acanthocarpae* simulantibus; floribus masculis spicas elongatas moniliformes formantibus numerosis; staminibus 5.

COAHUILA (Llano de Guaje): margin of playa at base of Lomas del Aparejo, abundant, erect globose bush 10–16 in. tall, August 28, 1940, *Johnston & Muller 777* (TYPE, Gray Herb.); margin of playa near Tanque La India, erect usually globose bush up to 18 in. tall, 1940, *Johnston & Muller 781* (G); margin of playa near Tanque La India, growing among low bushes and supported by them, stems 3 ft. long, 1940, *Johnston & Muller 785* (G).

This plant was observed only about the margin of the playa in the Llano de Guaje, about 100 km. northeast of Sierra Mojada. It grew with *A. obovata,* but was much more common than that species. The only other *Atriplex* observed in the region was *A. canescens,* which grew in the desert-scrub back from the dry-lake. The soil about the playa was only moderately saline. No species of *Suaeda,* for example, was found in the region.

The species is probably most closely related to *A. acanthocarpa* from which it is quickly distinguished by its fruit. The fruiting bracts bear

*New Phanerogams from Mexico, III. See Jour. Arnold Arb. 21: 253–265 (1940).

4 well developed longitudinal wings, in the manner of *A. canescens,* rather than being covered with irregularly arranged numerous coarse flattened appendages. The fruiting bracts most suggest those of *A. linearis* and some forms of *A. canescens,* but differ in their very long slender conspicuous rostrum and in the lack of a stipe. The species commonly had a low bushy habit very similar to that of *A. obovata,* but some plants (represented by no. 785) had the sprawling habit of *A. acanthocarpa.* The leaves varied in form; some had leaves similar to those of *A. obovata* (no. 781), but most of the plants had sinuately toothed leaves suggestive of *A. acanthocarpa.* Of all the many plants examined only those in one colony had the bract with lobed wings. This is represented by no. 785. Some of the fruits of this collection have the wings well developed and subentire while others have some of the wings broken down into a row of flattened appendages. In habit of growth, foliage and fruit, therefore, this collection gives the clearest indication of the relationship of *A. Stewartii* and *A. acanthocarpa.*

I am naming this species in honor of my good friend Mr. Robert Stewart of Santa Elena Mines, who accompanied me when it was collected. Without Mr. Stewart's help, Mr. Muller and I could not have visited the great Llano de Guaje. In fact, he was responsible for much of the success of our collecting trip in Coahuila this past summer. Not content with contributing indirectly to the study of the Coahuilan flora, Mr. Stewart has now started to botanize. His name is very fittingly asociated with this interesting Coahuilan plant.

Atriplex reptans, sp. nov.

Planta dioica perennis rhizomatosa depressa prostrata pallida foliosissima; rhizomatibus valde elongatis ad 3–4 mm. crassis; ramis foliatis abundantibus, raro elongatis saepe congestis 2–5 cm. longis dense ascendenter ramosis; foliis oppositis crassulis ovato-oblongis vel elliptico-oblongis 2.5–4.5 mm. longis 1.5–2 mm. latis medium versus vel infra medium latioribus saepe quam internodiis subduplo longioribus basi connatis apice obtusiusculis; floribus masculis in axillis foliorum superiorum glomeratis; glomerulis 3–5-floris inconspicuis, lobis perianthii 4 triangulari-ovatis, filamentis ad 1.4 mm. longis compressis, antheris rosaceis; floribus femineis saepe solitariis in axillis foliorum superiorum gestis; bracteis fructiferis minutis inconspicuis 2.5–3 mm. longis infra medium et ultra connatis; partibus connatis 1.2–1.4 mm. latis (medium versus latioribus) 0.7–0.8 mm. crassis, faciebus alte convexis nullo modo appendiculatis vel rugosis, basi rotundis sessilibus; partibus liberis bracteae crassis stricte ascendentibus ovato-triangularibus, apice obtu-

siusculis, margine integris vel basim versus crasse unidentatis; seminibus brunneis crasse biconvexis radicula lateraliter erecta apice circa 4/5 altitudinis seminis attingente cotyledonem nullo modo superantibus; stylo fere ad basim bilobato.

COAHUILA: local on flats at the base of a gypseous ridge a mile or so east of Laguna de Jaco, September 9, 1940, *Johnston & Muller 1081,* pistillate (TYPE, Gray Herb.), *Johnston & Muller 1080,* staminate (G).

This remarkable *Atriplex* was discovered while travelling from San Vicente southwesterly to Jaco. It was seen only on the flats at the eastern base of the gypseous ridges to the east of Lake Jaco. These flats are probably flooded after each rain. The *Atriplex* is the dominant and most common and conspicuous plant upon them. It forms irregular mats frequently a meter or more broad. I suspect that the plant is gypsophilous. It is evidently related to *A. Watsoni* Nels. (*A. decumbens* Wats.) of the coast of California and Baja California. It agrees with that western plant in having opposite leaves and similar fruiting bracts. It differs conspicuously from this relative in having the staminate flowers in inconspicuous axillary glomerules rather than in conspicuous terminal moniliform spikes.

Fendlera rigida, sp. nov.

Frutex rigidus erectus 5–18 dm. altus supra intricate ramosus; caulibus saepe numerosis cortice nigrescente obtectis basim versus ad 1 cm. crassis, supra dense breviter ramulosis, ramulis subdivaricatis brunneis non raro subspinescentibus, internodiis ad 14 mm. longis; foliis saepe congestis, non raro subfasciculatis; lamina crassa lineari 10–15 mm. longa 1.2–2.5 mm. lata, apice rotundata vel obtusa, basi in petiolum 1–2 mm. longum 0.3–0.5 mm. crassum tomentulosum abrupte contracta, supra convexa vel medium versus supra costam obscure impressa basim versus villosula, alibi pilis pallidis rigidis 0.2–0.3 mm. longis adpressis sparsis ornata; marginibus folii valde revolutis costam latam planam subattingentibus et canaliculos duos angustos fundo pilis minutis abundantissimis barbellatis ornatos formantibus; floribus parvis apice ramulorum 1–3; pedicellis 2–4 mm. longis canescenti-puberulentibus; calyce canescente puberulente, lobis triangularibus ad 3 mm. longis acutis (maturitate ad 5 mm. longis saepe ascendentibus et media capsulam superantibus), tubo calycis ad 5 mm. diametro ad 2 mm. profundo; petalis albis extus medium versus sparse pilosis, lamina ovato-triangulari 4–5 mm. lata et 4.5–5.5 mm. longa apice acutiuscula margine saepe erosa, basi in unguem 3.5 mm. longum 1–1.5 mm. latum abruptissime contracta; staminibus sepalos superantibus, filamentis (i.e. a basi antheris usque ad basim

staminum) ca. 3.5 mm. longis, anthera (appendiculo apicale 0.6 mm. longo inclusa) 1.8 mm. longa quam lobis filamenti ca. 3 mm. longis breviori; stylo piloso ca. 3.6 mm. longo, ovario glabro; capsula late ovoidea (stylis persistentibus exceptis) ad 5 mm. longa.

COAHUILA: common on the coarse volcanic tuff near the mouth of the canyon at San Antonio de los Alamos, September 2–3, 1940, *Johnston & Muller 912* (TYPE, Gray Herb.).

A well marked species most closely related to *F. linearis* of the Sierra Madre near Monterey. It is a stiffer, more densely branched bush with shorter, more hairy leaves, broader sepals, and much shorter, stouter capsules. It was seen only in the Sierra San Antonio, in the vicinity of San Antonio de los Alamos, where it was confined to coarse volcanic tuff. It grew high on the canyon wall and on sunny flats, particularly favoring seams in the beds of tufa. In habit it formed a stiff upright bush with the short, stiff numerous branchlets intricately entangled above.

Genistidium, gen. nov. Leguminosarum.

Calyx campanulatus, lobis elongatis tubo longioribus, duobus superioribus alte connatis. Petala longe unguiculata, vexillo suborbiculato dorso infra apicem secus lineam medialem pilos minutos gerente alibi glabro, alis lunato-oblongis glabris late evidenterque auriculatis, petalis carinae obtuse lunatis evidenter lateque auriculatis margine tertia parte exteriore laminarum connatis. Stamen vexillare omnino liber basim versus puberulentum, stamina cetera in vaginam (margine basim versus puberulentam) connata. Antherae homomorphae. Ovarium subsessile 4–6-ovulatum. Stylus inflexus subteres subcorneus subulatus supra medium ubique barbatus apice stigmate capitato minuto terminali donatus. Legumen lineare compressum rectum bivalvatum uniloculare, valvis coriaceis, suturis crassiusculis. Semina suborbiculata compressa estrophiolata. — Frutex erectus parvus ramosissimus rigidus strigosus. Folia trifoliolata, foliolis integerrimis elongatis firmis enervatis exstipellatis. Stipulae rigidusculae subulatae minutae. Flores flavi in axillis foliorum superiorum saepe unifoliolatorum solitarii vel raro geminati.

Genistidium dumosum, sp. nov.

Planta fruticosa 2.5–5 dm. alta rigida globosa dense intricateque ramosa; ramis erectis numerosis abundanter ascendenter ramosis basim versus 2–3 mm. crassis inconspicue sed distincte 8–15-costatis, juventate pallidis dense strigosis deinde glabrescentibus et viridibus; foliis alternis abundantibus trifoliolatis dense strigosis, petiolis 1–4 mm. longis; foliolis oblanceolatis 5–18 mm. longis firmis medio-costatis sed enervatis apice

acutis, duobus lateralibus subsessilibus, foliolo mediali breviter petiolulato et majori; stipulis subulatis 1–1.5 mm. longis subpersistentibus; inflorescentia racemiformi dissitiflora bracteata; floribus in parte superiore ramulorum gestis ex axillis foliorum (saepe unifoliolatorum quam floribus saepe longiorum) orientibus, 5–25 mm. distantibus unoquoque breviter et inconspicue pedunculato; pedunculo ad 1 mm. longo summum ad apicem florem solitarium et bracteas duas subulatas 1.5–2 mm. longas strictas gerente; calyce basi plus minusve obliquo in pedicellum 2–3 mm. longum abrupte transmutato, tubo 2.5–3 mm. longo sparse strigoso, lobis duobus inferioribus fere ad apicem connatis cuneatis ad 3 mm. longis, lobis lateralibus et supremo subulatis 3 mm. longis; alis flavis, ungue curvato 4 mm. longo ad 0.8 mm. lato, lamina 6 mm. longa medium versus 2.5 mm. lata carinam 1–2 mm. superante; carina alba, unguibus 3.8 mm. longis, laminis 4.5 mm. longis et 2.8 mm. latis; vexillo flavo medium versus viridi-maculato, lamina ca. 8 mm. lata, ungue ca. 3 mm. longo; staminibus 5–6 mm. longis; ovario secus marginem superiorem strigoso; legumine (submature) strigoso recto 2–2.5 cm. longo ca. 4 mm. lato.

COAHUILA: frequent along the summit of the cliffs of volcanic tuff at San Antonio de los Alamos, September 2–3, 1940, *Johnston & Muller 944* (TYPE, Gray Herb.).

This small bush, though in gross habit much suggesting the *Papilionatae-Genisteae* of the Old World, is, doubtless, a member of the *Galegeae* and, particularly, of the *Galegeae-Craccanae* as defined by Rydberg, Am. Jour. Bot. **10**: 488 (1923) and No. Am. Fl. **24**: 156 (1923). It appears to have its closest relations in *Tephrosia* and *Peteria*, from which it differs in its dense bushy habit of growth, coarsely auriculate petals, trifoliolate leaves and bearded subulate (rather than flattened) style. From *Tephrosia*, in particular, it further differs in its veinless leaflets and completely free vexillar stamen. From *Peteria*, in particular, it further differs in the absence of spinescent stipules, and in the less well developed inflorescence, and better developed calyx-lobes.

The plant was seen only about the summit of the high cliffs of coarse volcanic tuff which dominate San Antonio de los Alamos. At this locality it was observed at several stations and was always scattered on level areas just back of the summit of the tuff-cliffs in arid exposed situations.

Nama Stewartii, sp. nov.

Herba succulenta foliosa erecta 1–2 dm. alta viscida e radice 2–4 mm. crassa palari annua oriens glandulifera (glandulis minutis stipitatis); caulibus solitariis vel pluribus saepe e basi sursum ramos elongatos

stricte ascendentes proferentibus hispidulis et glanduliferis; foliis succulentis alternis oblanceolatis apice angulatis obtusiusculis, supra medium latioribus deinde basim versus gradatim attenuatis, margine saepe revolutis, supra hispidulis subtus pilis sparsis obsitis vel subglabris; cymis numerosis apicem versus ramulorum gestis folia suffulcientia haud vel vix superantibus; pedicellis 1–4 (saepe ad 2) mm. longis; calyce sub anthesi 5–6 mm. longis, deinde 1–2 mm. longioribus, lobis erectis ciliolatis spathulato-linearibus apice ca. 0.5 mm. latis, fructiferis quam capsula subduplo longioribus; corolla infundibuliformi-campanulata 7–9 mm. longa rosacea, lobis 2.5–3 mm. latis rotundis; staminibus inaequalibus fere ad vel paullo supra medium cum corolla coalatis, parte libera 2–3.5 mm. longa subcompressa, parte adnata 2.5–3 mm. longa praesertim supra medium anguste alata; stylis distinctis hispidulis; capsula 3–4 mm. longa glandulifera compresse ovoideo-ellipsoidea; seminibus ca. 50 brunnea angulate subglobosis ca. 0.4 mm. longis minute alveolatis.

COAHUILA: Picachos Colorados, slope at west end of cliffs, 1940, *Johnston & Muller 139* (G); between Carrizo and Carricito on gypseous ridge, 1940, *Johnston & Muller 159* (G); Castillon, confined to gypsum flats, 1940, *Johnston & Muller 1271* (G); foothills of Sierra de las Cruces west of Santa Elena Mines, confined to gypsum-flats, 1940, *Johnston & Muller 228* (G); Sierra de las Cruces, gypsum flats and cliffs at south base of Picacho de San Jose, August 29, 1940, *Johnston & Muller 814* (TYPE, Gray Herb.)

This species is probably most closely related to *N. Havardii* of the Big Bend area in southern Brewster County, Texas, but is a lower, less robust, more branched and more juicy plant which is more glandular and has a much scantier indument. The herbarium specimens are green, rather than gray. The fresh plants are dense with numerous stems and thick fleshy leaves. They are light green and somewhat slimy. The corolla-lobes are an intense pink or rose color on the inner face and much paler on the outer surface. The corolla is smaller (7–9 rather than 9–12 mm.) than in *N. Havardii,* and the filaments are adnate only to about their middle, rather than distinctly above their middle as in *N. Havardii.* The species is gypsophilous and was found only on gypseous soils or on pure gypsum. In the eastern foothills of the Sierra de las Cruces, about Santa Elena Mines, it was present on nearly all the scattered exposures of gypsum, even on small isolated exposures of only a few square meters in extent.

It is a pleasure to associate the name of Mr. Robert M. Stewart with this interesting gypsophile. Mr. Stewart, drawing on his knowledge of the geological structure of the region, accompanied and guided me to

various exposures of gypsum in the area about Santa Elena Mines. It is appropriate that this, the most characteristic gypsophile of the Sierra de las Cruces, be associated with his name.

Petrogenia, gen. nov. Convolvulacearum.

Flores solitarii parvi in axillis foliorum superiorum brevissime pedicellati nullo modo aggregati pentameri. Sepala 5 inaequalia imbricata calycem et corollam superantia, bracteolis parvis. Corolla minima campanulata flava, lobis brevibus induplicatis sub anthesi ascendentibus. Stamina glabra, filamentis linearibus, antheris fundum sinuum loborum corollae vix superantibus. Ovarium perfecte biloculare 4-ovulatum. Stylus fere ad basim bifidus, stigmatibus duobus capitatis. Capsula globosa bilocularis saepe 4–seminata 2–4-valva membranacea apicem versus villosa. Semina glabra. — Herba prostrata fruticulosa sericea pilis dibrachiatis adpressis abundanter strigoso-vestita. Folia parva numerosa.

Petrogenia repens, sp. nov.

Planta perennis sericea; caulibus prostratis rigidulis laxe ramosis e radice palari profundo erumpentibus non rariter in nodis radiculas gerentibus foliosis elongatis 1–5 dm. longis saepe ca. 1 mm. crassis, internodiis saepe 5–10 mm. longis; foliis numerosis alternis, lamina firma elliptica vel lanceo-elliptica 3–9 mm. lata 7–14 mm. longa concolore apice acuta vel rotunda basi in petiolum 1–2 mm. longum gradatim vel abrupte contracta; floribus in axillis solitariis, pedicellis 0.5–0.8 mm. longis; lobis calycis inaequalibus; lobis exterioribus ad anthesim 3.5–4 mm. longis ovato-lanceolatis infra medium 1.5 mm. latis apice acutis, fructiferis ca. 6 mm. longis et 3 mm. latis ovatis acuminatis; lobis interioribus 2.5–3 mm. longis lanceolatis acuminatis basim versus ad 1 mm. latis, maturitate ad 5 mm. longis 1 mm. latis lanceolatis; bracteolis 2–2.5 mm. longis ca. 0.5 mm. latis, maturitate ad 3 mm. longis inconspicuis lobis calycis conspicue brevioribus; corolla viridi-lutea inconspicua quam calyce breviore 3–3.5 mm. longa, a basi ca. 1 mm. diametro sursum ad limbum 4 mm. diametro valde sed gradatim ampliata; lobis corollae 5 ascendentibus 1–1.2 mm. longis et latis apice late obtuso-rotundis extus infra medium sparse villosis alibi glabris, sinibus apertis angulatis; staminibus 5 ad 1 mm. supra basim corollae affixis, filamentis glabris linearibus 1 mm. longis basim sinuum corollae attingentibus, antheris in ambitu subcircularibus ca. 0.4 mm. diametro basim sinuum corollae vix superantibus; ovario 4-ovulato sub anthesi ca. 1 mm. longo subcylindraceo infra medium glabro apice stylos duos imam ad basim connatos ca. 1.9 mm. longos filiformes gerente; capsula bilocu-

lari (utroque loculo saepe biseminato) globosa ad 3.5 mm. diametro membranacea supra medium sparse villosa quam calyce breviore et ab eo laxe velata; seminibus saepe 4 glaberrimis ca. 2 mm. longis dorso convexis ventre angulatis.

COAHUILA: foothills of Sierra Hechiceros, 9 mi. south of El Tule, about rocks on gravelly ridge of rhyolite, 1940, *Johnston & Muller 1374* (G); Sierra de la Cruces near Santa Elena, limestone ledges, 1940, *Johnston & Muller 211* (G); Lomas del Aparejo, eastern margin of Llano de Guaje, limestone ledges, 1940, *Johnston & Muller 776* (G); south end of Sierra del Pino, limestone ledges, 1940, *Johnston & Muller 731* (TYPE, Gray Herb.); Sierra Planchada, 6 mi. northeast of Esmeralda, limestone ledges, 1940, *Johnston & Muller 835* (G); Sierra Almagre, limestone ledges, 1940, *Johnston & Muller 1162* (G); hillside 8 mi. west of Saltillo, about limestone rocks, 1938, *Johnston 7661* (G). CHIHUAHUA: Sierra San Carlos, road to mine, base of limestone cliffs, 1940, *Johnston & Muller 53* (G); Santa Eulalia Mts., limestone ledges, 1885, *Pringle 591* (G). SAN LUIS POTOSI: Minas de San Rafael, 1910, *Purpus 4915* (G).

This interesting little plant evidently belongs to the *Convolvulaceae-Dicranostyleae* as defined by Hallier, Bot. Jahrb. **16**: 569 (1893). The material collected by Pringle and Purpus has been determined as *Cressa,* but that is obviously incorrect, since the plant has a 4-seeded globose capsule, inconspicuous greenish campanulate corollas, a calyx of unequal lobes which invests both flowers and fruit, and stamens which are only barely exserted from the corolla. Finally, it is a rock-loving xerophyte, rather than, as in *Cressa,* an inhabitant of moist saline soils. By Hallier's key, p. 563, *Petrogenia* traces out either to the African genus *Seddera,* which differs in its small calyx, toothed filaments and very different style, or to the rather heteromorphic genus, *Bonamia.* Our present Mexican plant, however, differs from *Bonamia* in its small inconspicuous yellow corollas, the calyx which over-tops both corolla and fruit, the nearly exserted stamens, and its very different habit. I do not think that *Petrogenia* is closely related to *Bonamia.*

In western Coahuila *Petrogenia* is widely distributed and can be expected on almost any sunny hillside with ledges or cliffs of limestone. Its wiry creeping stems and silvery leaves commonly fill crevices on limestone ledges or form carpets about large rocks on slopes below limestone cliffs. Only at one locality, near the south base of the Sierra Hechiceros, have I seen this plant growing away from limestone rocks. At this locality it grew about large rocks on a sunny ridge formed of decomposed rhyolite. It seems probable that the igneous rock at this

locality was unusually basic since several other species, otherwise known only from limestones, grew with the *Petrogenia* there.

Salviastrum canescens (Gray), comb. nov.

Salvia texana var. *canescens* Gray, Proc. Am. Acad. **8**: 368 (1872).
Salviastrum texanum var. *canescens* (Gray) Cory, Rhodora **38**: 407 (1936).

Corolla pink, marked with two elongate yellow spots at the base of the lower lip, subtubular, 2 cm. long, villous-hispidulous outside, glabrous inside except for a few scattered hairs above the base; limb very oblique; tube 1.7–2 mm. thick at base, gradually expanding and becoming ca. 3.2 mm. thick at summit; lower (and most protruding) lip of corolla 5 mm. broad, 3.5 mm. long, broadly notched, abruptly narrowed at base into a claw 1.5 mm. broad and ca. 0.6 mm. long; lateral lobes rounded, 1.5–2 mm. long; upper lip about 1.5 mm. long, notched; stamens attached 15 mm. above base of corolla, rudimentary pair of stamens about 0.5 mm. long; fertile filaments compressed 1.5 mm. long, 0.25 mm. wide; larger anther-sac ca. 1.2 mm. long borne on a thick curved connective ca. 0.5 mm. long; smaller anther-sac about 0.9 mm. long, subsessile; style 15 mm. long, not exserted; stylar lobes 3–3.5 mm. long, flattened, lanceolate 0.5 mm. wide.

COAHUILA: dry chalky soil in a small open exposed arroyo near the high eastern ridge, Sierra del Pino northeast of Noria, 1940, *Johnston & Muller 646* (G).

The above cited collection agrees very closely with the original material of Gray's *Salvia texana* var. *canescens*. This variety has remained known only from fruiting plants collected near the Pecos River, Texas, by Charles Wright in 1849. A description of the corolla, from the new collection, is supplied above. This reveals that the variety, *canescens*, is not at all closely related to *S. texanum*. It is a plant with tubular corollas and evidently has its closest relations with *S. dolichanthum* Cory, from which it differs in its much smaller flowers, more slender fruticulose habit and different inflorescence. The flowers of *S. canescens* are lateral, being borne along the lower part of leafy shoots. The leaves surpass the subtended flowers. In *S. dolichanthum* the flowers are borne in a terminal inflorescence composed of numerous whorls of flowers and short bracts. The persisting stems of *S. canescens* are fruticulose and apparently represent several years growth. Those of *S. dolichanthum* are annual growth springing from a strong perennial root. The plant was seen only twice in Coahuila, once near the crest of the high eastern ridge of the Sierra del Pino and again at the mouth of the canyon at

the southern end of the same range. At both localities it grew in patches of chalky calcareous soil on dry sunny slopes. At both stations it was locally common.

Leucophyllum pruinosum, sp. nov.

Frutex 10–25 dm. altus, partibus junioribus griseis pruinosis molliter tomentosis pilis ad 0.5 mm. longis ramos graciles elongatos ca. 0.2 mm. longos superimpositos gerentibus; partibus vetustioribus plantae aliquantum glabrescentibus griseoribus; ramulis elongatis saepe 1–2 dm. longis ascendentibus; foliis alternis saepe 4–10 mm. distantibus, lamina ovata vel late elliptica vel suborbiculari costata sed enervata 8–16 mm. longa 5–12 mm. lata, apice rotundata vel obtusa, basi in petiolum 2–4 mm. longum saepe abrupte contracta, subtus saepe plus minusve pallidiore; calyce in alabastro candido (lobis late lanceolatis erectis) ad anthesi ca. 4 mm. longo 2–3 mm. longe pedicellato; corolla purpurea 9–14 mm. longa extus sparse glandulifera eam *L. ambigui* persimulante.

San Luis Potosi: rocky hillside 11 miles south of Matehuala, pale bush 12–24 dm. tall with purple flowers, 1938, *Johnston 7569* (type, Gray Herb.). Nuevo Leon: arid limestone slopes east of Soledad, 5500 ft., 1940, *Shreve & Tinkham 9695* (G); low shrub, loma near Doctor Arroyo, 6200 ft., 1940, *Shreve & Tinkham 9682a* (G).

This plant of southern Nuevo Leon and adjacent San Luis Potosi is a relative of *L. ambiguum,* of Hidalgo, from which it differs conspicuously in its indument. Typical *L. ambiguum* has a dense felt-like indument and is usually tawny. In *L. pruinosum* the herbage is covered with much less abundant coarser grayish or white trichomes and is loosely tomentose. The plant has a frosted appearance. Though related to *L. ambiguum,* the plant may be separated at a glance from its more southern relative.

Leucophyllum griseum, sp. nov.

Frutex 8–18 dm. altus rigide ascendenter ramosus, partibus juvenilibus pilos compositos minutos abundantissimos griseos gerentibus evidenter griseo-vestitis, maturis paullo glabrescentibus; ramulis 5–15 cm. longis numerosis ascendentibus, internodiis saepe 1–10 mm. longis; foliis alternis oblanceolatis vel rariter subobovatis 5–15 mm. longis saepe 2–5 (rariter ad 7) mm. latis costatis sed enervatis, apice rotundis vel obtusis, basi in petiolum 1–2 mm. longum gradatim contractis; calyce ad anthesim ca. 3 mm. longis basi in pedicellum saepe gracilem 1–2 mm. longum contractis, lobis lanceolatis ascendentibus; corolla purpurea 10–18 mm. longa, limbo 9–15 mm. diametro extus glabrato vel pilifero, lobis ovatis ascendentibus in facie interiore saepe piliferis.

COAHUILA: crest of an isolated hill one mile north of San Rafael (31 mi. south of Castillon), two plants, 9 dm. tall, 1940, *Johnston & Muller 198* (G); mouth of Cañon de Tinaja Blanca, Sierra de las Cruces, 1940, *Johnston & Muller 256* (G); foothills of the Sierra Planchada, 6 mi. north of Esmeralda, shrub 6–9 dm. tall, 1940, *Johnston & Muller 341* (TYPE, Gray Herb.); Parras, 1880, *Palmer 969* (G); Sierra de Parras, 1910, *Purpus 4639* (G); Sierra de Parras, 5500–6000 ft., 1940, *Shreve & Tinkham 9856* (G); rocky base of hills 3 mi. north of Peña Pass, bush 9–18 dm. tall, 1938, *Johnston 7721* (G). ZACATECAS: 21 miles south of Concepcion del Oro, 6–15 dm. tall, 1938, *Johnston 7353* (G); Cedros, *Lloyd 106* (G) and *? 58* (G).

This species is related to *L. minus* of western Texas, northern Chihuahua and extreme northwestern Coahuila, and probably includes most of the Mexican material which has been identified as that species. In floral structures, size and shape of leaves, and habit of growth, the plants are very similar. The two species differ, however, in the nature of their induments. In *L. minus* the indument is very dense and close and almost suggests a coating of aluminum paint. The very numerous small white trichomes are flat and stellate. The primary axis of the trichomes is extremely shortened and its tip appears as a small dot or knob at the center of the radially arranged arms. In *L. griseum* the indument is much less dense and more loose and at best appears as a dull thin grayish felt. The small grayish trichomes have a short but distinctly elongate axis along which the more or less unequal arms are borne at different heights. The tip of the axis projects well beyond the upper arms. The trichome is, hence, clearly three dimensional, rather than flat as in *L. minus*. During the past summer I visited the southern parts of the range of *L. minus* and the northern parts of the range of *L. griseum*. I found absolutely no evidence that these species intergraded. The species are readily distinguished in the field and herbarium.

Leucophyllum candidum, sp. nov.

Frutex globosus saepe 3–6 (rariter ad 12) dm. altus ramosissimus, ramulis saepe 5–15 cm. longis, internodiis saepe minus quam 1 cm. longis, partibus junioribus indumentum candidum densum tomentosum gerentibus; pilis abundantissimis elongatis verticellos plures superimpositos ramulorum longiusculorum gerentibus; foliis oppositis vel suboppositis numerosis concoloribus medio-costatis sed enervatis, lamina 6–10 (rariter ad 16) mm. longa 4–8 mm. lata late obovata vel raro oblanceo-obovata apice obtuse angulata basi in petiolum 1–3 mm. longum saepe abrupte contracta; calyce 3–4 mm. longo lobis 1–1.5 mm. latis acutis cum pilis elongatis ramosis abundantibus crasse vestitis; corolla

purpurea 12–17 mm. longa intus sparse pilifera, limbo 10–13 mm. diametro, lobis 4–5 mm. longis suborbiculatis tubo basi imo 2.5 mm. crasso; filamentis ca. 4 et 4.5 mm. longis sparse piliferis; ovario subglabro vel tomentoso; stylo glabro vel sparse pilifero.

COAHUILA: El Berrendo near Muzquiz, 4000 ft. alt., fl. purple, 1939, *White 1799* (G); limestone ledges near mouth of southern canyon, Sierra del Pino, pallid bush 1–2 ft. tall, not common, 1940, *Johnston & Muller 730* (G); crest of cliffs of volcanic tuff near San Antonio de los Alamos, frequent, globose bush 1–1.5 ft. tall, 1940, *Johnston & Muller 936* (G); between Carrizo and Carricito, on small ridge, local, bush 3–4 ft. tall, 1940, *Johnston & Muller 160* (TYPE, Gray Herb.); small isolated hill one mile north of San Rafael (31 mi. south of Castillon) abundant pallid shrub 1–2 ft. tall, 1940, *Johnston & Muller 199* (G).

This plant of northern Coahuila is closely related to *L. zygophyllum* of the dry valleys of southern Nuevo Leon. These two geographically well separated species differ in the size and form of the complex trichomes covering the herbage and accordingly in the nature and appearance of the indument. The trichomes of the northern *L. candidum* are relatively coarse, those on the leaves being about 0.2 mm. in diameter and those on the calyx being about 0.2 mm. long. The trichomes of *L. zygophyllum* are, at most, a quarter that size and are less rigid in texture. Even under 40–50 magnification the indument on the leaves of *L. zygophyllum* appears to be very dense and thin. The indument is so dense and thin that the older leaves, to the naked eye, appear to have a smooth grayish cuticle or a waxed surface rather than a coating of very abundant fine stellate trichomes. The thicker, whiter, felty indument of *L. candidum* is much less smooth and the coarser trichomes make it appear somewhat pulverulent or pruinose. The very much greater coarseness of the trichomes in *L. candidum* make its calyx-lobes and pedicels appear to be very coarse and thick.

The plant is a very attractive one and is probably widely distributed in the foothills of northern Coahuila. In addition to the stations where I collected it, I noted it in the foothills of the Sierra de las Cruces near Santa Elena Mines, at the base of the Sierra Almagre, and in the northern foothills of the Sierra Planchada north of Esmeralda. It was usually frequent locally and commonly growing with either *L. laevigatum* or *L. griseum*. Even when not in flower the plant is conspicuous for no other shrub in the region has an indument so white.

Haploesthes robusta, sp. nov.

Planta robusta succulenta glabra; caulibus 2–3 mm. crassis pluribus decumbentibus vel ascendentibus 15–20 cm. longis sparse ascendenter

ramosis foliosis e radice supra breviter crasseque ramosa erumpentibus; foliis glaberrimis 1–3 cm. distantibus 4–6 cm. longis, 1.5–2.5 mm. crassis linearibus basim versus compressis et 1.5–2.5 mm. longe vaginatis; capitulis 5–7 caules et ramulos terminantibus ca. 8 mm. altis, involucro cylindrico-turbinato ca. 6.6 mm. longo et 4.5 mm. crasso; tegulis viridibus ad 6 mm. longis 3.5 mm. latis ellipticis apice rotundis; floribus ligulatis ca. 5, tubo 4 mm. longo et 0.5 mm. crasso, lamina 3.5–4 mm. longa et 2.5 mm. lata apice minute bidentata; floribus disci 30–40 ca. 5 mm. longis, faucibus ca. 1.5 mm. longis ad 1 mm. crassis, lobis papillatis triangularibus ad 0.5 mm. longis erectis; achaeneis ad 2 mm. longis nigris ca. 15-costatis, costis angustis elevatis pilos ascendentes gerentibus.

COAHUILA: 3 miles south of Cuatro Cienegas, succulent plant on salt land, 2400 ft. alt., July 18–20, 1939, *Stephen S. White 1923* (TYPE, Gray Herb.).

In its habit of growth, coarse stems, very coarse large succulent leaves, and large heads, this species is readily distinguished from *H. Greggii*, the only other species described for the genus. It is a robust plant with coarse widely spreading pale annual stems springing from a very coarse perennial root. The florets are more numerous than in its relative, and with the exception of the blade of its ligules, they are larger than in its relative.

The type of *H. Greggii* was collected by Gregg at "Cienega Grande," Coahuila, a locality now called Cienega del Carmen. This is located in the hilly country 30 kilometers northeast of Parras, along the old road to Saltillo. *Haploesthes Greggii* is a plant of gypsum. The newly proposed species comes from saline soils at lower altitudes.

Perityle Castillonii, sp. nov.

Planta perennis ad faciem scopulorum adpressa 1–5 dm. diametro minus quam 1 dm. alta; caulibus pluribus fruticulosis e caudice lignoso saepe crasso erumpentibus; ramulis hornis foliosis 4–20 cm. longis gracilibus ad 1 mm. crassis sparse laxeque ramosis subcinereis minute villosulis, internodiis 3–30 mm. longis quam lamina foliorum longioribus; foliis oppositis; lamina deltoideo-ovata 5–25 mm. longa 4–25 mm. lata glandulis sessilibus aureis obsita sparse villosa, margine utrinque dentibus crassis 3–4 acutiusculis, basi truncata vel reniformi; petiolo quam lamina saepe breviore 3–15 mm. longo breviter villosulo; capitulis ramulos foliatos terminantibus discoideis 5–6.5 mm. altis 5–15 mm. longe pedunculatis; tegulis ca. 10 sub-biseriatis 3–5 mm. longis 0.4–1 mm. latis praesertim infra medium naviculatis unicarinatis apicem acutum

vel obtusum versus villoso-ciliatis alibi saepe sparse villosis; floribus 25–30 flavis; corolla 3–3.5 mm. longi, tubo ca. 1 mm. longo ad 0.5 mm. crasso glandulis stipitatis dense obsito, faucibus ca. 1.5 mm. longis ad 1 mm. crassis purpurascentibus sparse glanduliferis; lobis triangularibus ad 0.6 mm. longis; lobis styli ad 1.5 mm. longis subulatis supra medium barbellatis; filamentis ca. 0.9 mm. longis; antheris ca. 1.2 mm. longis appendiculas 0.3–0.5 mm. longas proferentibus; achaeniis ad 2.9 mm. longis nigrescentibus ca. 0.7 mm. latis, margine incrassatis haud vel vix ciliolatis, latere convexis minute et saepe adpresse hispidulis, apice haud coronatis epapposis vel rariter setam solitariam 0.5–2.5 mm. longam proferentibus.

COAHUILA: Canyon del Indio Felipe, Sierra Hechiceros, frequent in crevices of cliffs in deep canyon, Sept. 18, 1940, *Johnston & Muller 1359* (TYPE, Gray Herb.); Canyon del Indio Felipe, common in crevices of cliffs, Sept. 27, 1940, *R. M. Stewart 10* (G). CHIHUAHUA: dry sunny cliffs near "Virulento," 16 miles south of Trincheras, 1940, *Johnston & Muller 1430* (G).

The precise relationship of this species is uncertain. In Rydberg's treatment, No. Am. Fl. **34**: 11–27 (1914), of the *Perityle-Laphamia* complex, it might fall in either *Monothrix* or *Leptopharynx*, keying out to *Monothrix Palmeri*, of northwestern Arizona, or to *Leptopharynx Lemmoni*, of southern Arizona. Of these two species, the latter most suggests *P. Castillonii*, but differs in its broader tegules, larger corollas, and different indument.

The present species is one of the small depressed suffrutescent cliff-plants which Gray and Watson placed in *Laphamia*. The differences in habit of growth and in the breadth and keeling of tegules, which have been used to separate *Perityle* and *Laphamia*, so completely intergrade, that I am unable to find any real difference between the two genera. Rydberg attempted to sort the species of *Perityle* and *Laphamia* among six genera. Unfortunately, these segregate genera also intergrade and what is more serious seem to be flagrantly unnatural. I am forced to the conclusion that *Laphamia* and *Perityle* should be united and, accordingly, I am describing the present "*Laphamia*" as a species of *Perityle*.

The species appears to be restricted to the elevated igneous country of extreme northeastern Chihuahua and adjacent Coahuila. This highland is about 25 km. wide and nearly 100 km. long with a long axis roughly paralleling the Rio Grande which lies about 50 km. to the north. Its eastern end, the rhyolitic Sierra Hechiceros, extends into Coahuila north of Castillon. Its western end, the bedded lavas of the Sierra Coyote, extends to Trincheras, south of Ojinaga. The species was found at both

ends of this highland, at "Virulento," 26 km. south of Trincheras, where it was abundant, rooting in crevices of sunny basalt cliffs, and in and near the Canyon del Indio Felipe, in the Sierra Hechiceros, 35 km. north of Castillon. In the Sierra Hechiceros it was frequent on shaded cliffs in the Canyon del Indio Felipe, just within Coahuila and in the branch of that canyon leading to Rancho Encampanada, within Chihuahua. The plant is evidently a long-lived perennial. Rooted in crevices it forms a coarse dense woody caudex that may become a gnarled woody mass as big as a man's fist. The slender leafy branches are flattened against the face of the cliff. The material from the shaded cliffs of the Sierra Hechiceros have leaf-blades 10–25 mm. long, whereas those from the exposed cliffs at "Virulento," though of similar outline, are only 5–9 mm. long. The differences are evidently ecological.

This interesting plant is named in honor of Sr. Tirso Castillon, of Castillon, to whom I am indebted for a memorable trip, with him and Mr. Robert Stewart, into the Sierra Hechiceros. During this trip, near the northernmost point in the properties of the Hacienda de Castillon, at the head of the gorge of the Canyon del Indio Felipe, I obtained my first collections of the species.

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THE COMPARATIVE MORPHOLOGY OF THE ICACINACEAE
I. ANATOMY OF THE NODE AND INTERNODE

I. W. Bailey and R. A. Howard

With four plates

INTRODUCTION

Extensive investigations of a wide range of representative dicotyledons have demonstrated statistically that the structural specializations of the cambium and its derivatives tend in general to progress along a number of clearly defined lines. Not only are these salient phylogenetic modifications of the cambium and of the secondary xylem more or less closely correlated, but also at times they synchronize with morphological specializations of the foliar and floral organs. That they are significant in discussing the relationships and classification of families within certain orders of the dicotyledons has been shown by Vestal (9), Tippo (8) and Taylor (7).

Extensive exploratory investigations have now progressed to a stage where it becomes desirable to initiate *intensive* studies of specific families. This is essential in obtaining more detailed information regarding the relative rates of morphological specializations in different organs and tissues, in determining which trends of specialization are irreversible, and in securing clues regarding the actual significance of anatomical criteria in discussions concerning specific, generic and tribal relationships.

GENERAL PLAN OF PROCEDURE

In the case of most families of the dicotyledons, two types of material only are available at present for morphological and anatomical investigations, viz. (1) herbarium specimens and (2) the collections of woods assembled at Yale, Oxford and Harvard Universities and at other institutions. It is evident, accordingly, that in initiating an intensive study of a particular family, it is necessary to focus one's attention largely upon the secondary xylem and upon such tissues and organs as are adequately preserved in ordinary herbarium specimens, i.e. slender stems, leaves and flowers.

Our investigations of the Icacinaceae will deal successively with the gross anatomy of the node and internode, the histology of the tracheary

elements, parenchyma and rays of the cauline secondary xylem, and subsequently with the comparative morphology of the leaves, pollen and flowers. The Icacinaceae were selected for study because they exhibit a wide range of structural specializations and constitute a family that needs critical revision from the taxonomic point of view. Furthermore, the Icacinaceae were differentiated into sub-families and tribes by Engler (1) partly upon the basis of anatomical criteria. Therefore, there is a historical taxonomic precedent for dealing with this family from an anatomical aspect.

The bulk of the putative icacinaceous genera — approximately 60 — has been included in the Icacinoideae. Three genera only are referred to the sub-families Lophopyxidoideae and Cardiopterygoideae. In view of the fact that *Lophopyxis, Cardiopteryx* and *Pteleocarpa* are of questionable icacinaceous affinities, we shall defer consideration of these genera until later and confine our attention for the present to the Icacinoideae.

Our discussions of the vascular structures of this sub-family are based upon the study of 50 genera and of more than 150 species. As will be demonstrated subsequently, such a representation of genera and species is adequate for blocking out the salient lines of structural specializations in the Icacinoideae. Ten genera are not represented in American herbaria. Nor is it possible at present to obtain material of these rarer plants from European collections. Therefore, an analysis of the structure and relationships of these genera must be deferred until suitable material becomes available.

Tribes of the Icacinoideae

According to Engler (1 and 2), there are four tribes of the Icacinoideae which exhibit the following structural and anatomical differences:

1. Icacineae, trees or shrubs, seldom climbers. Vessels with scalariform perforations. Interxylary phloem absent.
2. Iodeae, climbing shrubs, sometimes with tendrils. Vessels with simple perforations. Xylem more prominently developed between the orthostiches of the stem.
3. Sarcostigmateae, climbing shrubs. Vessel elements short with simple perforations. Xylem uniformly developed around the stem. Interxylary phloem present.
4. Phytocreneae, climbing or twining shrubs. Vessel elements short with simple perforations. Xylem prominently developed between the orthostiches. Strands of mixed leptome and hadrome in the orthostiches, rarely continuous around the stem.

This classification of the Icacinoideae attempts to differentiate the anatomically more normal Icacineae from three distinct tribes of climbing plants which exhibit different anomalous modifications of the secondary body. In the case of the Phytocreneae, the so-called strands of mixed leptome and hadrome ("tracheids") actually are secondary phloem which projects into the secondary xylem of young stems of *Phytocrene, Pyrenacantha, Miquelia, Polycephalium* and *Chlamydocarya, Figs. 1 and 2.* These inwardly projecting strands of phloem in the orthostiches fluctuate in number depending upon variations in phyllotaxy, Robinson (3). Compare *Figs. 2 and 3.* They are composed of sieve tubes, companion cells, parenchyma and thick-walled, angular, more or less regularly oriented phloem fibers, *Fig. 4.* In young stems of *Trematosperma cordatum* Urb., as Engler (1) has shown, the strands are more numerous than the orthostiches and do not project conspicuously into the xylem. During subsequent growth of the young stems of *Chlamydocarya Soyauxii* Engl. and *C. Thomsoniana* Baill., they may be occluded in xylem. Such strands of interxylary phloem differ, however, from those of the Sarcostigmateae, *Fig. 10,* by being composed in part of thick-walled fibers, *Fig. 4.*

Although the young stems of the Iodeae, *Figs. 7–9,* may be differentiated from those of the Sarcostigmateae and Phytocreneae by the absence of interxylary phloem and of inwardly projecting strands of hard bast, there is some question whether they can be separated in all cases from those of the Icacineae upon the basis of the anatomical criteria listed by Engler. In the first place, as will be demonstrated in the next paper of this series, a number of the Icacineae are characterized by having vessels with simple porous perforations. In the second place, not all of the Iodeae have as large vessels or as prominently projecting wedges of secondary xylem between the orthostiches of young stems as the species investigated by Robinson (4), Engler (1) and others might lead one to suppose. In the third place, certain representatives of the Icacineae exhibit more or less conspicuous anomalous modifications of the secondary body.

As indicated in *Fig. 13,* the young stems of *Mappianthus iodoides* Hand.-Mazz. exhibit a normal cylindrical development of the secondary body. The vessels are of small size and are more or less uniformly distributed. This is in marked contrast to the conspicuously anomalous structure of such representatives of the Iodeae as *Iodes tomentella* Miq., *Iodes ovalis* Bl., *Fig. 7,* and *Iodes philippinensis* Merr., *Fig. 9.* The young internodes of *Hosiea sinense* (Oliv.) Hemsl. & Wils., *Figs. 5 and 6,* likewise have a normal cylindrical secondary body. In Wilson's material,

the vessels are of small size and are aggregated in three sectors of the secondary xylem, *Fig. 5;* whereas in Yü's specimens, *Fig. 6,* the vessels are relatively large and are more or less uniformly distributed throughout the secondary xylem. *A priori,* such conspicuous structural differences might be interpreted as due to errors in the determination of the specimens. It is significant in this connection, however, that similar structural variations occur in different lateral branches of the same stem of *Iodes liberica* Stapf. Certain of the branches have small vessels as shown in *Figs. 8 and 11;* whereas others have very large ones as illustrated in Fig. 12. Furthermore, the vessels may be uniformly distributed around the stem or may be aggregated in certain sectors of the cross section of the woody cylinder.

In the case of the Icacineae, scandent species of such genera as *Pleurisanthes, Leretia, Lavigeria,* etc., frequently exhibit a tendency to form relatively large vessels which may be aggregated in more or less prominently developed parts of the secondary xylem, i.e., between the orthostiches of young stems. That conspicuously anomalous structures are formed by successive cambia in the older stems of *Lavigeria salutaris* Pierre is indicated in *Fig. 16.* Such facts as these suggest that it may be difficult to differentiate the Iodeae from scandent representatives of the Icacineae upon the basis of Engler's anatomical characterizations of the two tribes.

NODAL ANATOMY

There are three distinct types of nodal anatomy in the stems of dicotyledons. In the *trilacunar* type of node, the vascular supply of the leaf produces three separate gaps in the stele, in the *unilacunar* type, a single gap, and in the *multilacunar* type, more than three gaps. Sinnott (5) has shown that these categories of nodal anatomy are significant in any comprehensive discussion of the relationships and classification of the various families of the dicotyledons. In addition, Sinnott and Bailey (6) have presented evidence which suggests that the primitive nodal condition in dicotyledons is trilacunar. Extensive unpublished investigations of the nodal anatomy of both seedlings and adult plants support this earlier inference, and indicate that the unilacunar condition arises from the trilacunar by the suppression of its lateral traces and corresponding gaps. The multilacunar condition develops from the trilacunar by the addition of successive pairs of lateral traces and gaps.

Although the finer details of the nodal structure of the Icacinaceae will be discussed later in connection with the leaf, it is advisable at this

point to emphasize the fact that the Icacinoideae may be divided into two distinct sections upon the basis of salient features of their nodal anatomy. One section of the sub-family is characterized by having trilacunar nodes, *Fig. 14*, and the other section by its unilacunar ones, *Figs. 1 and 15*. The multilacunar condition is not encountered in any of the Icacinoideae that we have studied.

TRILACUNAR — ICACINOIDEAE

Icacineae

Anisomallon	Dendrobangia	Lasianthera	Pittosporopsis
Apodytes	Discophora	Leptaulus	Platea
Calatola	Emmotum	Medusanthera	Poraqueiba
Cantleya	Gastrolepis	Oecopetalum	Stemonurus
Cassinopsis	Gonocaryum	Ottoschulzia	Urandra
Citronella	Grisollea	Pennantia	

UNILACUNAR — ICACINOIDEAE

Icacineae

Alsodeiopsis	Lavigeria	Merrilliodendron
Desmostachys	Leretia	Pleurisanthes
Humirianthera	Neoleretia	Rhaphiostylis
Icacina	Mappia	Rhyticaryum

Iodeae

Hosiea	Natsiatum	Mappianthus
Iodes	Polyporandra	

Sarcostigmateae

Sarcostigma

Phytocreneae

Chlamydocarya	Polycephalium
Miquelia	Pyrenacantha
Phytocrene	

It is evident from this tabulation of genera that there is one section of the Icacineae which resembles the Iodeae, Sarcostigmateae, and Phytocreneae in having unilacunar nodes. Furthermore, it is significant that a truly scandent habit of growth rarely, if ever, occurs among the trilacunar representatives of the Icacineae. On the contrary, several genera of the unilacunar Icacineae exhibit an evident tendency towards the acquisition of a scrambling, twining or climbing habit. This suggests that certain of the unilacunar Icacinaceae may be transitional in form and structure between the non-scandent, trilacunar Icacineae and

the unilacunar Iodeae, Sarcostigmateae and Phytocreneae in which a twining or climbing habit of growth is dominant. Such a supposition is strengthened by a study of the vessels of the Icacinoideae which will be discussed in the second paper of this series.

SUMMARY

1. The reasons for initiating an intensive study of the comparative morphology of the Icacinaceae are presented.

2. The general plan of procedure in this series of investigations is briefly outlined.

3. Engler's anatomical characterizations of four tribes of the Icacinoideae are discussed and the question is raised whether the Iodeae can be differentiated in all cases from the Icacineae by the suggested anatomical criteria.

4. A study of the nodal anatomy of the Icacinoideae reveals the fact that there are two distinct categories of the Icacineae, (1) those characterized by trilacunar nodes and (2) those having unilacunar ones.

5. Certain of the unilacunar Icacineae appear to be somewhat transitional in form and structure between the non-scandent, trilacunar Icacineae and the unilacunar Iodeae, Sarcostigmateae, and Phytocreneae in which a twining or climbing habit of growth is dominant.

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DESCRIPTION OF PLATES

Plate I

Fig. 1. *Chlamydocarya capitata* Baill., *Linder 1076.*
Transverse section of the node. The vascular tissues of the leaf at (m) produce a single gap in the stele. × 14.

Fig. 2. *Chlamydocarya capitata* Baill., *Linder 1076.*
Transverse section of the internode, showing five wedges of large-vesselled secondary xylem and five strands of hard bast, correlated with a 2/5 phyllotaxy. × 11.

Fig. 3. *Pyrenacantha repanda* Merr., *Wenzel 2607.*
Transverse section of a stem having 1/3 phyllotaxy. The three arcs of large-vesselled xylem and the three strands of hard bast are separated from the internal primary body by a nearly normal cylinder of secondary xylem. × 22.

Fig. 4. *Chlamydocarya capitata* Baill., *Linder 1076.*
Transverse section of a strand of secondary phloem, showing sieve tubes and thick-walled fibers. × 90.

Fig. 5. *Hosiea sinense* (Oliv.) Hemsl. & Wils., *Wilson 960.*
Transverse section of a stem, showing four growth zones of small-vesselled secondary xylem. × 16.

Fig. 6. *Hosiea sinense* (Oliv.) Hemsl. & Wils., *Yü 1932.*
Transverse section of a stem, showing four growth zones of large-vesselled secondary xylem. × 16.

Plate II

Fig. 7. *Iodes ovalis* Bl., *H. U. 2775-J.**
Transverse section of the stem, showing "anomalous" development of large-vesselled secondary xylem. × 8.

Fig. 8. *Iodes liberica* Stapf., *Linder 1102.*
Transverse section of a stem, showing somewhat asymmetrically developed small-vesselled secondary xylem. × 25.

Fig. 9. *Iodes philippinensis* Merr., *Philip. Bur. Sci. No. 987.*
Transverse section of a stem, showing "anomalous" development of large-vesselled secondary xylem. × 25.

Plate III

Fig. 10. *Sarcostigma Horsfieldii* R. Br., *H. U. 2771-J.*
Transverse section of the xylem, showing included strands of soft bast. × 50.

Fig. 11. *Iodes liberica* Stapf., *Linder 1102.*
Transverse section of *Fig. 8* more highly magnified. × 50.

*The numbers *H. U. 2775-J* and *H. U. 2771-J* refer to specimens in the wood collection at Harvard University.

FIG. 12. *Iodes liberica* Stapf., *Linder 1102.*
Transverse section of another part of the same stem, showing large-vesselled secondary xylem. × 50.

PLATE IV

FIG. 13. *Mappianthus iodoides* Hand.-Mazz., *How 72874.*
Transverse section of a stem, showing normal development of the secondary xylem. × 20.

FIG. 14. *Citronella sarmentosum* (Baill.) Howard, *Bonati 1113.*
Transverse section of a node showing trilacunar condition. Median trace and gap at (m). Lateral traces and gaps at (1). × 22.

FIG. 15. *Lavigeria salutaris* Pierre, *Milbraed 10536.*
Transverse section of the node and the base of the petiole, showing unilacunar condition at (m). × 13.

FIG. 16. *Lavigeria salutaris* Pierre, *Milbraed 10536.*
Transverse section of an older stem, showing "anomalous" structure formed by successive cambia. × 16.

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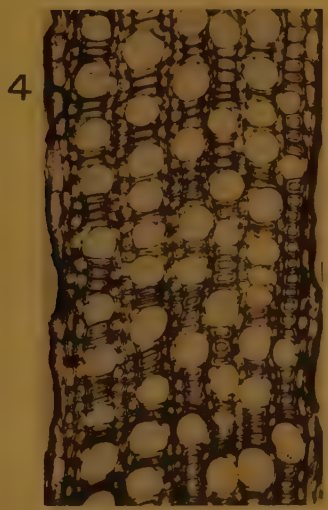
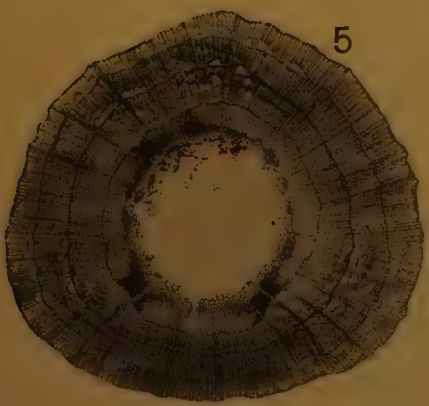
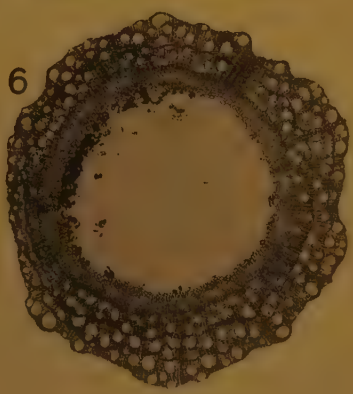
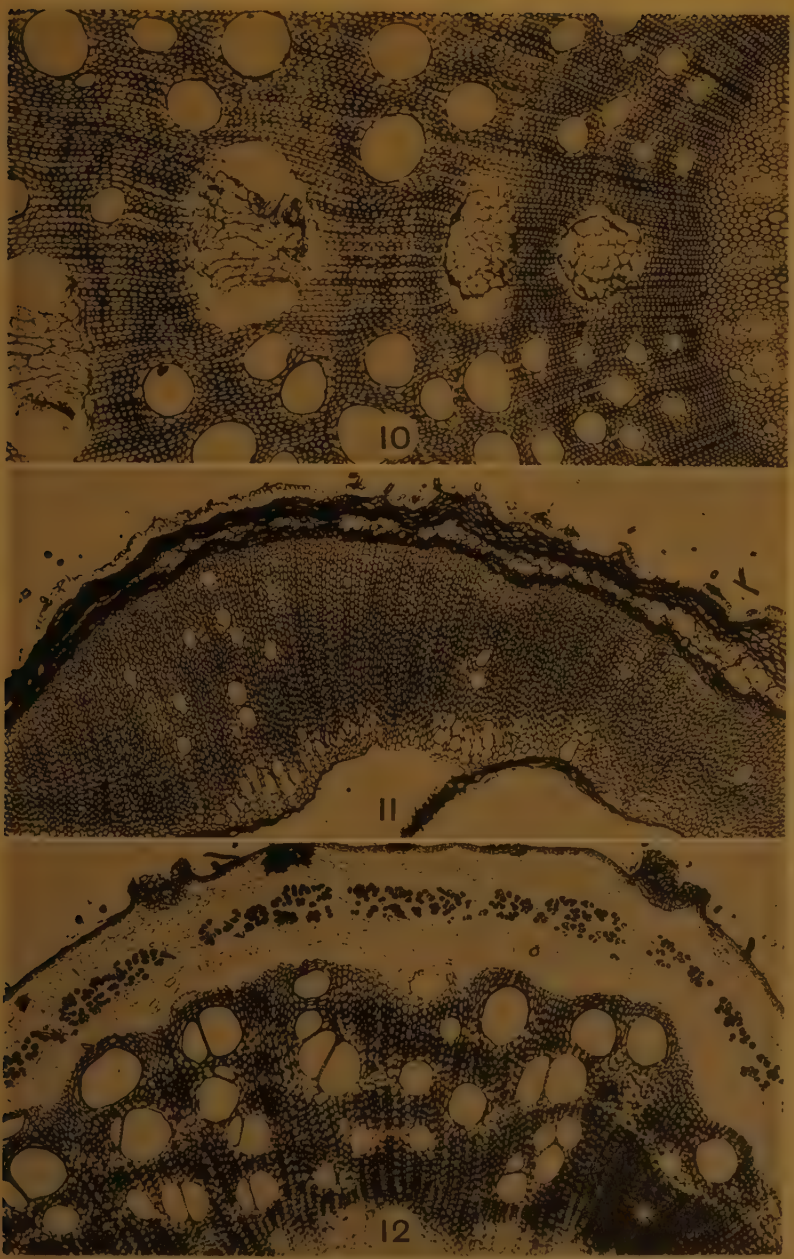




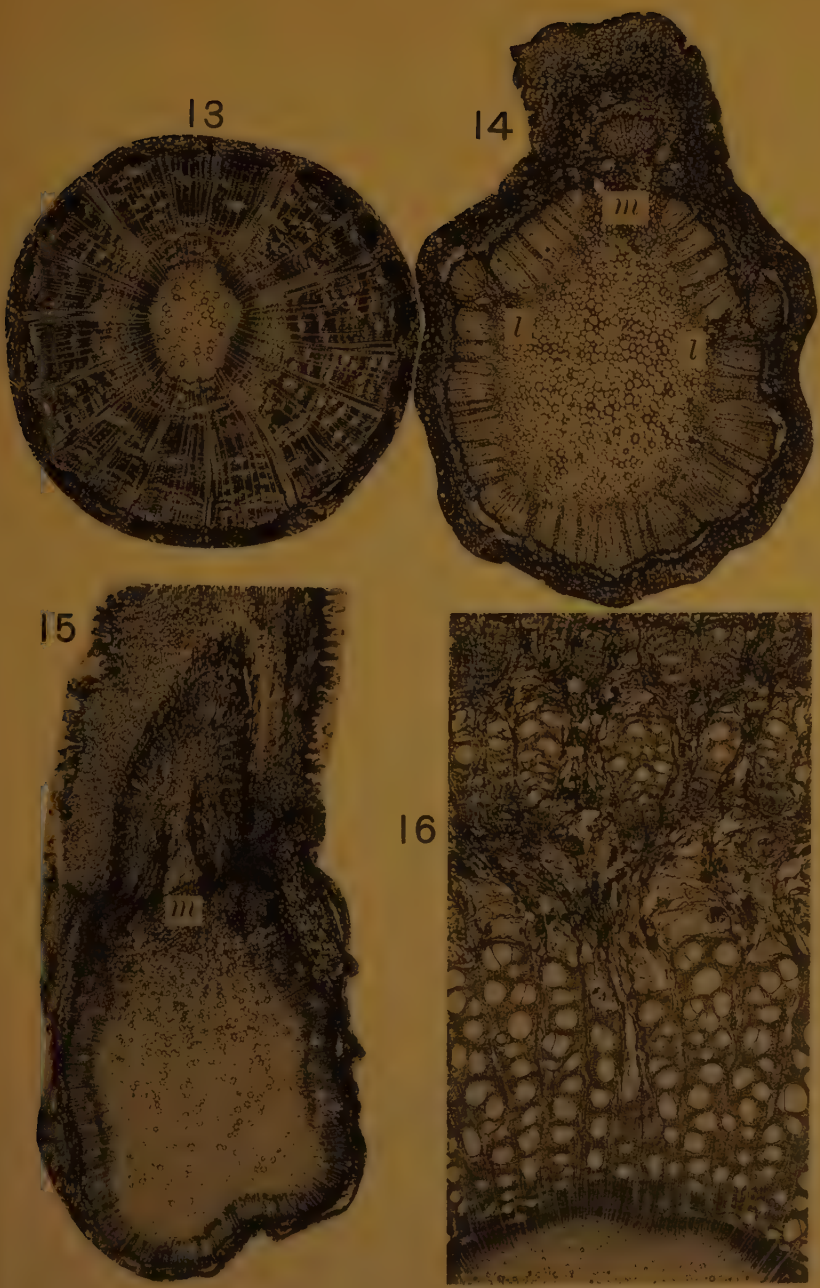


COMPARATIVE MORPHOLOGY OF THE ICACINACEAE

Comparative Morphology of the Icacinaceae



Comparative Morphology of the Icacinaceae



Comparative Morphology of the Icacinaceae

FULL-TONE — MERIDEN

A DISCUSSION OF NEW AND CRITICAL SYNONYMY

LEON CROIZAT

THIS PAPER is devoted to discussions of certain cases of synonymy having special taxonomic and nomenclatural interest. The treatment here outlined will be found useful in dealing with many more binomials and trinomials than it is possible to consider.

1. **Euphorbia Fendleri** T. & G., Pacif. Rail. Rept. **2**: 175. 1855.

Euphorbia Fendleri var. *dissimilis* Payson, Bot. Gaz. **60**: 379. 1915.
Euphorbia Fendleri var. *typica* Wheeler, Bull. Torrey Club **63**: 444. 1936 (*syn. nov.*).

Article 16 of the International Rules of Botanical Nomenclature, 1935, the cornerstone of priority, orders that a group with the same circumscription, position, and rank can bear only one valid name, this being the earliest legitimately published one. No exception whatever is made in this Article, or in any other Article, in favor of names holding the typic constituent of a group (here: var. *typica*). *Euphorbia Fendleri* var. *dissimilis* and *E. Fendleri* var. *typica* have the same position (both being published under *E. Fendleri*), the same rank (both being trinomials), the same circumscription (*Payson 119* and *Payson 493*, type-specimens of var. *dissimilis*, having the same taxonomic limits as *Fendler 800*, which is the type-specimen of *E. Fendleri* and *E. Fendleri* var. *typica*), the similarity of the circumscription being freely admitted by Wheeler himself (Amer. Midl. Natur. **21**: 527. 1939). It follows that Payson's name published in 1915 renders superfluous and illegitimate that of Wheeler, published in 1936 (see Art. 60 [1]).

Wheeler's fear that the biological complex under *E. Fendleri* is bound to bear the name *E. Fendleri* var. *dissimilis* under Art. 30 is mistaken. This Article does not apply, being concerned with a special case unrelated to the one here discussed; *Payson 119* and *Payson 493* have the same circumscription as *Fendler 800*, so that *E. Fendleri* var. *dissimilis* (1915) becomes the legitimate synonym of *E. Fendleri* (1855). Also misplaced is Wheeler's fear (*loc. cit.*) that: "the subdivisional name including the type of a species may shift, according to the vagaries of the individual, from a name based upon the type of the species to one based on another type." The subdivisional name including the type of a species is the nomenclatural type of the species, which, by definition of

Art. 18, is a constituent part of the binomial, and it may not be separated from it; its type-specimen is by definition the same as that of the binomial. Payson's variety does not include the "type" of *E. Fendleri,* as Wheeler claims, but is included under it, since this binomial is the earlier name, and its type-specimen (*Fendler 800*) and that of Payson's variety (*Payson 119, 493*) have the same circumscription.

It may be objected that, when published, *E. Fendleri* var. *dissimilis* was superfluous under Art. 60 (1), because there was a valid name (*E. Fendleri*) for the group to which this trinomial was applied. To this the answer is that under Art. 60 (1) a name is superfluous only if there was a prior valid name, with its particular circumscription, position, and rank. It is patent that *E. Fendleri* var. *dissimilis* was not superfluous, because this name is a trinomial, while *E. Fendleri* is a binomial, the ranks not being the same.

The reference here made to *Euphorbia* is not to be construed as the writer's acceptance of this generic name for the species involved.

2. **Sanicula canadensis** L. var. **typica** Wolff, Pflanzenr. 61 (**IV. 228**): 67. 1913.

Sanicula canadensis L. var. *genuina* Fernald, Rhodora **42**: 467. 1940 (*syn. nov.*).

In publishing *Sanicula canadensis* L. var. *genuina,* referred to the Linnean binomial "in part, as interpreted by Gray, Bicknell, and other authors," because he apparently objected to Wolff's description of var. *typica,* Fernald has violated five Articles and one Recommendation of the rules. He has violated Arts. 16 and 60 (1) in presenting a name (var. *genuina,* 1940) which has the same rank, position and circumscription of a name (var. *typica,* 1913) previously and legitimately published. He has violated Art. 59 in apparently rejecting as objectionable Wolff's name, merely because this name was accompanied by a description which did not agree with Fernald's own understanding of the Linnean plant. He has violated Arts. 47 and 50, believing that an alteration of diagnostic characters required a new name, whereas such alteration (Art. 47, emend. 1936) does not even require the indication of the name of the author correcting the diagnosis. He has acted against Rec. xxxii *quinquies* in failing to specify what part of the Linnean binomial he intended to include under his var. *genuina,* an omission which is significant in view of the previous existence of a legitimately published var. *typica* in the same circumscription, position and rank, this peculiarity requiring an "exact citation" in the fullest sense of the cited Recommendation. As it is well known (Rec. xviii and Rec.

xxxv) the epithets *typicus* and *genuinus* are perfectly synonymous, it being immaterial that Fernald published a var. *genuina* against Wolff's earlier var. *typica*.

3. **Sanicula canadensis** L. var. **grandis** Fernald, Rhodora **42**: 467. 1940.

Sanicula canadensis L. var. *typica* Wolff, Pflanzenr. 61 (**IV. 228**): 67. 1913, *quoad descr., excl. spec. Linn.*

Fernald cites under var. *grandis*, as a synonym, Wolff's var. *typica*. This is an incorrect citation, presented against Rec. xxxii *quinquies*. Wolff might have erred in improperly describing or interpreting the Linnean specimens when publishing *S. canadensis* var. *typica*, but the fact remains that this variety is based *by definition* upon the Linnean type-plant. Were it not so, the variety could not be designated as var. *typica*. Fernald admits, as a matter of course, that var. *typicus* has the same base as the binomial itself (cf. *Eupatorium album* L. var. *typicum* Fern. = *E. album* L. Mant. 111. 1767, cited in Rhodora **39**: 451. 1937), hence he may treat Wolff's var. *typica* as a synonym of his own var. *grandis* only to the extent of Wolff's alleged erroneous description, in no case including or involving in the synonymy the Linnean type-material.

4. **Lobelia Gaudichaudii** A. DC. in DC. Prodr. **7**: 384. 1839.

Lobelia Gaudichaudii var. *coccinea* Rock, Bull. Torrey Club **44**: 238. 1917; B. P. Bishop Mus. Mem. **7**(2): 117. 1919.

Lobelia Gaudichaudii var. *typica* St. John & Hosaka, Occ. Pap. Bishop Mus. **14**: 118. 1938 (*syn. nov.*).

St. John and Hosaka are correct in claiming (op. cit., 120) that in a species having as many variations as *L. Gaudichaudii* it is desirable to assign a subdivisional name to the original binomial. They err, however, in claiming (op. cit., 119) that Rock's var. *coccinea* was superfluous under Art. 60 (1), because *Lobelia Gaudichaudii* is a binomial, while *L. Gaudichaudii* var. *coccinea* is a trinomial, the two names not having the same rank. They erred, furthermore, in publishing their own var. *typica*, 1938, when there already was in the record another name (var. *coccinea*, 1917) with the same circumscription, position, and rank, thus violating a precise disposition of Art. 16 and Art. 60 (1). The oversight made by Rock in publishing var. *coccinea* is not corrected by St. John and Hosaka's violation of the very same Article which they cite against Rock. It was open to them to publish legitimately the typical subspecies of *L. Gaudichaudii*, because a subspecies has not the same rank as a variety. The two authors' comment (op. cit., 120) that "Rock's varietal

name is not only illegitimate but undesirable, because if restated it would make Rock's instead of Gaudichaud's earlier collection the type" is mistaken. Rock's varietal name cannot be said to be illegitimate for the reasons previously given. This name, however, is to be treated as a synonym of *L. Gaudichaudii*, because it is based upon material (*Shaw 12742; Nelson & Stove 10003*) that has the same circumscription as *Gaudichaud 149* (1837). This last collection is the one that must remain as the type-specimen of *L. Gaudichaudii*, and to it must be ultimately referred for comparison all the type-specimens of subdivisions that may be published under this binomial.

5. **Solidago nemoralis** Ait. var. **longipetiolata** (Mack. & Bush) Palmer & Steyermark, Ann. Mo. Bot. Gard. **22**: 660. 1935.

Solidago nemoralis Ait. var. *decemflora* (DC.) Fernald, Rhodora **38**: 226. 1936 (*syn. nov.*).

The validity of combinations in which the full bibliographical reference of the basinym is not given has been questioned at length by Fernald (Rhodora **39**: 309–310. 1937), whose criticism induced Steyermark to re-present for alleged "validation" (Rhodora **40**: 131–134. 1938) a list of already validly published combinations. Like Fernald, Wheeler is of the opinion that a bibliographical reference is an essential part of the citation (Madroño **4**: 273. 1938), and he has affirmed (Amer. Midl. Natur. **21**: 528. 1939) that at present definite rules for judging the validity of new names and combinations are needed.

These and similar opinions ignore the very existence of Art. 46, which is already in the Rules, stating that: "For the indication of the name (unitary, binary, or ternary) of a group to be *accurate* and *complete*, and in order that the date may be readily verified, it is necessary *to cite the author who first published the name* in question" (italics mine). It may be added that Art. 28 even authorizes the reduction of more complicated combinations to ternary names, and accepts as a legitimate, or rather as an *accurate and complete citation*, such names as: *Saxifraga Aïzoon* subforma *surculosa* instead of the full reference: *Saxifraga Aïzoon* var. *typica* subvar. *brevifolia* forma *multicaulis* subforma *surculosa*. Furthermore, Art. 48 states that whenever it is desirable or necessary to abbreviate a citation, the name of the publishing author being the most important must be retained. It is manifest, consequently, that the Rules do not require bibliographical data in order that a citation may be accurate and complete. In ignoring or rejecting *Solidago nemoralis* Ait. var. *longipetiolata* Palmer & Steyermark, and in presenting *S. nemoralis* var. *decemflora*, Fernald has vio-

lated Art. 58 and Art. 60 (1). Under Art. 58 it is immaterial that *S. longipetiolata* Mack & Bush, cited by Fernald as a synonym of his own combination, is later than *S. decemflora* DC., so long as it has been legitimately used in effecting a combination in a new rank.

6. **Cymbopogon Bequaerti** De Wild. Bull. Jard. Bot. Bruxell. **6**: 8. 1919.

Andropogon Bequaerti De Wild. loc. cit.; *nomen provisorium* sensu Art. 37 *ter*.

Sprague (Jour. Bot. **74**: 75. 1936) claims that provisional names (*nomina provisoria*) are illegitimate, while alternative or eventual names (*nomina eventualia seu alternativa*) are legitimate. This claim rests upon Art. 37 *ter*, which is the *only* Article in the Rules that is concerned with the matter, stating that: "A name of a taxonomic group is not validly published unless it is definitely accepted by the author who publishes it. A name proposed provisionally (*nomen provisorium*) in the anticipation of the eventual acceptance of the group, or of a particular circumscription, position or rank of a given group, or merely mentioned incidentally, is not validly published."

In publishing simultaneously *Cymbopogon Bequaerti* and *Andropogon Bequaerti*, De Wildeman proposed two names with the same circumscription and rank, one of them being necessarily a combination of the other in a different position. So doing, De Wildeman believed either that these two names were synonymous in the accepted taxonomic sense, or that they were not. If he did believe that the names were synonymous, he erred in publishing two names where one was sufficient, the other being superfluous (Art. 16, Art. 60 [1]) or illegitimate (Art. 40); if he did not so believe, he clearly acted to design a new combination "in anticipation of the eventual acceptance of the group," which is a patent violation of Art. 37 *ter*, and creates a *nomen provisorium*.

Contending, like Sprague, that alternative names are validly published, Furtado says (Gard. Bull. Straits Settl. **9**: 239–240. 1937) that the practice of publishing such names "has had an origin . . . which appears to me quite sound," and explains that if an author publishes a new species in a section or genus of disputable status, like, for instance, *Andropogon* and *Cymbopogon*, "a botanist in search of easy honours might at once seize the opportunity . . . to make new combinations under the alternative and disputed genus . . . It is to curtail such vexatious activity, and to keep the honour where it is due, that the practice of publishing simultaneous isonyms or alternative names has arisen. *Therefore it was but just that it was validated by the last Congress.*" (Italics mine.)

The "honour" of a botanist is a very minor consideration in the sight of the Rules (Art. 4), and Art. 37 *ter* specifically and peremptorily forbids as *nomina provisoria* names published in the anticipation of the eventual acceptance of the group. It is flagrant that Sprague's and Furtado's alternative and provisional names have the same status, Furtado stating that such names have been legitimatized by the Congress, 1935, precisely on account of the *very same* considerations that have induced the Congress to forbid the use of *nomina provisoria*.

It may be true that the discussion that preceded the actual voting of Art. 37 *ter*, as this Article now stands in the Rules, left some botanists under the impression that *provisional names* have been forbidden while *alternative names* have been permitted. However, the impression made upon some individual botanists is not to be confused as yet with the sovereign will of the Congress speaking its decision through an Article enacted in the Rules. The mere fact that *"seu eventuale"* was erased from the proposed draft of Art. 37 *ter* does not mean that eventual names have been approved by the Congress. Nothing can be "assumed" which is not clearly written in the Rules. The Rules themselves admit (Art. 5) that where the consequences of an Article are doubtful, established custom must be followed, such a "custom" being certainly not the private opinion of this or that expounder, nor, in the present case, that of multiplying the useless creation of names (Art. 4) to foresee future contingencies and combinations.

The editors of the Index Kewensis accept in practice the interpretation of *provisional* and *eventual* names as this is given here. They list *Cymbopogon Bequaerti* without comment, but follow the entry of *Andropogon Bequaerti* with the symbol "in syn.," which is tantamount to a rejection of its legitimacy with reference to Art. 40 of the Rules.

Some writers believe that names and combinations put forward without clear statement of rank, but with a suggestion that they belong in one or the other of two ranks, others besides the publishing author to make the conclusion, are *nomina provisoria* and not admissible under the "generally accepted Rules" (see, for instance, Fernald, Contr. Gray Herb. **131**: 266. 1940). This belief is hardly worthy of discussion. Names so published are legitimate because it is not an Article but a Recommendation (Rec. xxi), which is neither mandatory nor retroactive, that suggests that names should not be proposed without a statement of their rank. Any author may assign to these validly published names the rank which he believes to be fitting. These names, consequently, are absolutely not *nomina provisoria* in the sense of Art. 37 *ter*, because they are not proposed in the same publication and by the same author as

alternatives for other names, which is essential to the publication of a true *nomen provisorium*.

SUMMARY

With the exception of the last, the cases reviewed err in that they reveal an improper understanding of the type-concept, of the typical constituent of a binomial (trinomial *typicus, genuinus* and the like; cf. Rec. xviii and Rec. xxxv), and of priority. Such an improper understanding is displayed alike by editors and taxonomists, the cases here cited being a handful out of many, all of which are tainted by similar or identical errors.

It is undoubtedly very desirable that, as Art. 3 states, "the rules of nomenclature should be simple and founded on considerations sufficiently clear and forcible for every one to comprehend and be disposed to accept." Such simplicity and force, however, can be obtained only through a lucid and consistent interpretation of the Articles and Recommendations. The true needs of nomenclature are not determined by the needs of taxonomists who seldom use categories below the binomial. These needs are determined by the most involved and difficult cases that may arise under the Rules, because these are the cases that the Rules are most often called upon to solve.

It is a matter of common knowledge among taxonomists that one name and one type-specimen (for instance, a binomial and its type-specimen) may be used as the source of many combinations, all of which are "based" on the same name and type-specimen. Thus at the will of a taxonomist the same name and specimen may be treated as a variety, as a subspecies, as a species, and the like. The segregation of subsp. or var. *typicus* or its equivalent (cf. Rec. xviii, xxxv) is merely one of the many combinations that can be effected under the Rules around *the same name and the same type-specimen.* It is manifest that this combination, like every other one, cannot be effected in violation of priority (Art. 16, Art. 60 [1]). Thus it cannot be effected when there already exists in the record a group with the same circumscription, position, and rank. To effect it legitimately, Art. 16 would have to be amended, and a special clause inserted to the effect that the constituent element of a binomial or unit of lower rank (cf. Art. 18) is not subject to the action of the principle of priority. Such an amendment may be desirable or not, which is not the province of these brief notes to decide. What brooks no doubt is that so long as Art. 16 is not so amended, its provisions *must be respected.* To violate them means to publish an illegitimate name, which must be rejected. It may be

very desirable, as St. John and Hosaka point out (*loc. cit.*) to segregate a trinomial *typicus* in a group having many forms, but such segregation cannot be made, in this case, as Articles 16 and 60 (1) now read. Nothing can be assumed by anyone as being in the Rules (see Art. 74) which is not provided for by an Article previously approved by the Congress.

When taxonomists speak of a "type" they generally understand a *specimen* which is the base of a name. The Rules, on the contrary, understand as "types" both *specimens* and *names*. This distinction may be wise or not, which does not come here under discussion. The fact remains that such a distinction is made. To illustrate: Recommendation vii gives the utmost importance to the preservation of the original material on which the description of a new group is based, which this Recommendation calls "type," and which certainly agrees with the *type* that is commonly understood by taxonomists. Recommendation v, on its part, states that when revising a genus, an author should state which species he accepts as the nomenclatural type. Furthermore, Art. 18 legislates that a nomenclatural type is not necessarily the most typical or representative element of a group. It is manifest that the nomenclatural type spoken of by Rec. v and by Art. 18 is not a specimen nor its equivalent description or figure. In fact, the specimen or specimens that "typify" a genus are not designated by an author who *revises* the genus; they are designated by the author who *describes* the genus, barring insignificant exceptions (*species lectotypicae*). Moreover, it is not to be understood how Art. 18 can speak of the nomenclatural type not being "the most typical or representative element of a group," and Rec. vii can speak of the "type" on which the description of the new group is based, if these two "types" are the same thing. It is evident that these two types are not the same thing, that is to say that the nomenclatural type is a *name* (unitary name, binomial, trinomial, and the like) and the "type" in the sense of Rec. vii is a *specimen* or *figure* or *description*.

Having introduced so subtle a distinction in the concept of type, the Rules should have been amplified, thus effecting a proper discrimination in their Articles and Recommendations when speaking of "types." The astounding truth is that the Rules fail to do so. The best example of this confusion and contradiction is to be found in Art. 18, which, as it were, is the Article that clarifies the "type method" itself. This Article states that the nomenclatural type (sic) of a species is a specimen, description, or illustration, while Rec. vii and Art. 18 itself, as previously cited, imply that this type is a name. As the nomenclatural type of

Polyporus amboinensis, Art. 18 cites the figure and the description in Rumphius, Herb. Amboin. **4**: 129, *t. 57, 1.*

To clarify the issue, let us suppose that we segregate from *Polyporus amboinensis* the trinomial *typicus* and, having done so, we seek in the Rules an answer to the question whether the nomenclatural type of this binomial is the trinomial *typicus* or *plate 57, 1* of the *Herbarium Amboinense*. The answers we obtain are contradictory: Recommendation xviii and Rec. xxxv tell us very definitely that this type is the trinomial *typicus;* Rec. iv reveals that this type is either *plate 57* or the trinomial *typicus;* Art. 18 states that this type is only *plate 57*, but by implication contradicts itself, as previously seen, speaking of a nomenclatural type "which is not the most typical or representative element of the group."

So glaring and so inexcusable a contradiction spreads itself *all over the Rules*, in which the term "type" means arbitrarily names or/and specimens (cf. Recs. v, vii; Arts. 21[2], 30, 51, 52). In view of this contradiction and confusion it is not surprising that individual taxonomists should feel unequal to the task of coping with the term "type," and should be lost in a maze of contradictions and doubts when trying to attempt the solution of difficult problems of nomenclature. These problems involve a rigorous understanding of circumscriptions (defined by type-specimens, that is to say by *physical types*), of ranks (defined by names, in many cases these names being *nomenclatural types*), and of positions (involving transfers of names, with the specimens usually remaining unaffected). Thus, for instance, in the case of *Lobelia Gaudichaudii* previously discussed, *L. Gaudichaudii* var. *coccinea* has a very peculiar state in nomenclature and typification. It has the same rank and position as a potential *L. Gaudichaudii* var. *typica;* it has the same circumscription as this trinomial, because its type-specimens (*Shaw 12742; Nelson & Stove 10003*) have the same limits as *Gaudichaud 149* (1837), which is the physical type of both *L. Gaudichaudii* and *L. Gaudichaudii* var. *typica*. This notwithstanding, *L. Gaudichaudii* var. *coccinea* has not the full nomenclatural status of *L. Gaudichaudii* var. *typica* because it is not based upon the very same type-specimen of *L. Gaudichaudii*. However, not having the status of var. *typica, Lobelia Gaudichaudii* var. *coccinea* nevertheless forbids that var. *typica* be legitimately segregated, because it has the same position, circumscription, and rank as this trinomial (cf. Art. 16; Art. 60 [1]). Last but not least, var. *coccinea* is not superfluous in the sense of the Rules (Art. 60 [1]), because to be such it should have the same position, circumscription, and *rank* as *L. Gaudichaudii*, which is a binomial, not a trinomial. In brief, the

tangle of specimens and of names, of ranks and of circumscriptions is so close that we must marvel how St. John and Hosaka could ever hope to unravel it in the course of a brief taxonomic treatment. The reader is referred to Wheeler's writings (Contr. Gray Herb. **127**: 58. 1939; Amer. Midl. Nat. **21**: 527–529. 1939) for classic examples of meaningless discussion, in which the term "type" means things unknown and unknowable.

It is manifest that Art. 18 must be amended to read that the *nomenclatural type* of a species, or subdivision thereof, is the subdivision *typicus* or its equivalents (Rec. xviii, xxxv) next below in rank, specimens and descriptions being on the contrary *physical types* that determine the circumscription of the names. A careful study of Art. 4 and Art. 60 (1) is also advisable to see whether the "useless creation of names" may be made to cover the publication of such names as *Lobelia Gaudichaudii* var. *coccinea*.

ARNOLD ARBORETUM,
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A NEW GENUS OF FLACOURTIACEAE (PANGIEAE — HYDNOCARPINAE) FROM TROPICAL QUEENSLAND

C. T. White

With one plate

Baileyoxylon gen. nov. Flores dioici. Calyx 5-lobatus. Petala 5 valde imbricata, squamis hirsutis magnis totidem oppositis. Flores masculi: Stamina 5, petalis alterna, antherae magnae, loculis rima laterali dehiscentibus, filamentis brevis applanatis in connectivo lato gradatim productis. Flores foemini ignoti. Fructus ignotus. Arbor. Folia penninervia. Paniculae axillares et laterales, thyrsoideae.

Species 1 in Australia boreali crescens.

The genus is dedicated to Dr. Irving W. Bailey.

Baileyoxylon lanceolatum sp. unica.

Arbor ad 25 m. alta, cortice griseo (Kajewski), ramulis robustis lenticellatis, novellis ferrugineo-pubescentibus mox glabris. Folia petiolata, lanceolata, apice acuminata, basi cuneata; nervi et venuli supra indistincti, subtus leviter elevati; nervi praecipui ca. 10 in utroque latere, in venam intramarginalem irregularem 5–6 mm. remotam conjuncti; petiolus subrobustus, 1–1.5 cm. longus; lamina 10–16 cm. longa, 4–5 cm. lata. Paniculae thyrsoideae multiflorae axillares et laterales, 4–10 cm. longae, ramulis ultimis dense ferrugineo-pubescentibus basim versus gradatim glabrescentibus. Pedicelli robusti 1–2 mm. longi. Calyx extus ferrugineis pilis sparsis vestitus, 2.5 mm. diam., 5-lobatus, lobis rotundis. Flos masc.: Petala 5, imbricata, ovata, 3 mm. longa, cremeo-viridia (Kajewski) intus squama (aurantica — Kajewski), hirsuta petalum fere aequantia aucta. Stamina 5, cum petala alternantia, filamentis perbrevibus in connectivum latum gradatim attenuatis, antheris 2 mm. longis. Flores foem. et fructus ignoti.

Ghurka Pocket (Atherton Tableland), alt. 700 m. (common in rain forest), *S. F. Kajewski 1230* (male flowers in advanced bud), Sept. 24, 1929 (small tree, up to 15 m. high, leaves dark green); Boonjie (Atherton Tableland), alt. 700 m. (common in rain forest), *S. F. Kajewski 1263* (type: flowering specimens), Oct. 3, 1929, (medium sized tree, up to 25 m. high, bark medium grey, light yellow when cut, wood light yellow, petals cream-green, each petal having inside it a smaller orange "petal").

As there was some difficulty in satisfactorily placing Kajewski's plant, specimens were handed over to Dr. I. W. Bailey for help in elucidating its botanical affinities by anatomical means. Dr. Bailey kindly undertook to do this, and reported: "The general anatomical structure of the stem (including the node) is typically flacourtiaceous. Furthermore, it is of the more primitive structural type such as occurs in the Oncobeae and Pangieae. The combined structural and floral evidence suggests that the tree probably belongs in or near the Hydnocarpeae. The plant differs from such genera as *Hydnocarpus, Taraktogenos,* and *Trichadenia,* yet exhibits a combination of structures that occur in these genera. For example, the form of the stamens and the structure of the pollen are similar to certain species of *Hydnocarpus* and *Taraktogenos,* but unlike those of *Ryparosa.* Unfortunately, I have not been able to obtain pollen of the genus *Trichadenia.* Analysis of the leaf reveals no evidence which would exclude the plant from the Hydnocarpeae. On the contrary, certain structures of the leaf are suggestive of relationship with this group. In other words, I suspect that the plant is a new genus related to the Hydnocarpeae."

Later, flowers of *Trichadenia* were obtained from the U. S. National Herbarium, and the pollen examined by Dr. Bailey, who reported: "I have received some flowers of *Trichadenia.* The pollen of *Hydnocarpus, Taraktogenos, Trichadenia,* and the Queensland tree belong to the same general structural type which differs markedly from that of *Ryparosa.* The pollen of *Trichadenia* and of the Queensland plant both have a coating of oil or fat which brings them into closer relationship. The evidence from pollen, from leaves, nodes and stems, plus that from flowers, now indicates without doubt that the Queensland plant belongs in the *Hydnocarpeae,* and is a new genus related to *Trichadenia.* Dr. Dahl has checked my conclusions regarding the pollen evidence."

Dr. Bailey's findings are borne out by the floral structure. The new genus seems very close to *Trichadenia,* which differs in having a calyptrate calyx and stamens with an elongated filament.

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